

THE EMPEROR MOTHS OF EASTERN AFRICA

By

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The purpose of this article on Emperor Moths is to introduce people, in East and Central Africa, to this spectacular family and to give them some means of identifying the species. It is unfortunate that we cannot afford colour plates. Mr. Bally has aided in the production of half-tone photographs, which should help considerably in the recognition of species, if not with the same facility as with colour plates. There is, of course, available, at a price, volume XIV of Seitz' *Macrolepidoptera*, which includes coloured illustrations of most of the African Emperors.

In tropical countries Emperor Moths and Hawk Moths are the most popular families of the moths among amateurs, the former largely for their size and colourfulness, the latter more perhaps for their streamlined elegance and rapidity of flight. Furthermore, compared to some other families, both these groups are reasonably small in number of species and, despite their bulk, they can be incorporated in a moderately limited space if not too many examples of each species are retained. Admittedly some of the larger Emperors take up a disproportionate amount of room and it is advisable to make them overlap in the collection. If we consider, however, that the amateur is concentrating on this family to the exclusion of other moth groups, the position is not too alarming. There are somewhat over a hundred species of Emperors in East Africa.

What are Emperor Moths? Some people call them Silk moths, because the caterpillars of some species spin silk cocoons. A well-known example is the Tussor Silk Moth (*Antheraea paphia*) of the Orient. The true Silk Moth (*Bombyx mori*), however, neither belongs to Africa nor to the Emperor family. Many a Naturalist knows that one of the features of the Emperors is the possession of large coloured circles on the wings called "Eyespots" (or ocelli). (The family probably derived its name *Saturniidae* from the ringed planet, Saturn. The genus *Saturnia* belongs to the Holarctic Region.) This is not necessarily a criterion by which the family can be definitely recognized, although it helps. There are some *Saturniidae* (as they are called) without eyespots on any wings, merely small, window-like, transparent patches. There are even a few of the smaller species which do not show these "Glass Spots", as we will call them. Moreover, there are just a few moths of other families which have coloured eyespots on the wings; but such ocelli are more often spirals than circles and they are nearly always on the front or forewing and not on the hindwing.

In this paper we want to omit technical terms as far as possible, but we will assume an acquaintance with a few "common or garden" words. We should know what is meant by the *antennae* (feelers) on the head; what is meant by the thorax (to which the wings and legs are attached); the abdomen (which is *not* a tail); the forewings, hindwings and the "veins" (neuration). Then for simplicity we will refer to certain regions on the wings (Plate 1): base, inner line, medial area and medial line, outer line, margin and submarginal area and, of the forewing, the apex. Finally, the apex itself may be rounded or angular but if it is curved outwards it is said to be *Falcate*, a word you are not necessarily expected to know.

It is not very easy to give a concise and simple diagnosis to separate *Saturniidae* from other moth families. They are mostly large, with broad wings, usually ornamented with glass spots surrounded by coloured rings of the eyespot. The antennae are always strongly feathered in the male, less so in the female. They are not provided with coiled tongues like butterflies and many other moths and so it is no use expecting to see them sipping nectar from flowers. Nearly all fly by night and are readily attracted to light. To make this description more complete for the benefit of advanced readers in this subject we can briefly add a few other features:—"Labial palps minute. No frenulum. Humeral angle of hindwing expanded. Hindwing without extra humeral veins; the cubitus with three branches". Lastly, the early stages of Emperor Moths are characteristic, but we cannot deal with the life cycle here to any extent. Many of the caterpillars, for instance, possess series of tubercles, which may be armed with short bristles or with conspicuous, curved spines.

Before launching off on brief descriptions of the species, it is advisable to refer to some of the difficulties involved in this family. There have been many Entomologists of repute in the past who have studied African Emperor Moths, Boisduval, Le Cerf, Drury, Rebel and Westwood, to mention a few. In more recent years others like Jordan, Rothschild, Hering, Aurivillius, Gaede, Janse, Bouvier and Tams have explored the field. The nett results are the production of considerable data and the constructive organisation of certain portions of the family and, if I dare say so, a little confusion in other parts. The chief conundrums are in the *Bunaea-Nudaurelia* genera, and their related groups, *Aurivillius*, *Gonimbrasia*, *Lobobunaea* and so on. On venational grounds there might be more "fission" on the one hand; or, on other features, specifically in colour variations, perhaps more "fusion". I cannot presume here to make any definite decisions. I put forward a few tentative suggestions, but for the purpose of this paper I have neither adequate material, nor have I seen sufficient types, nor again have I dissected sufficient *Saturniid* genitalia, to warrant any dogmatic conclusions. Revisional work is certainly needed, the examination of long series and of types; dissection and far more breeding data; before decisions can be reached in the *Nudaurelia* complex or in other genera, such as *Decachorda*. After considering other generic plans, such as Dr. Bouvier's, I have thought it advisable just for our present need, and for convenience, to follow more or less the scheme in Seitz, with slight and, again, somewhat conjectural alterations.

To the beginner, however, I would say, do not worry about all this preamble. Let's get on with the job! He may discern from these remarks, nevertheless, that he can do some useful research. He can breed Emperor Moths, record notes on their early stages and on the variations shown in the progeny. Furthermore, Museums would be pleased to have more material from any part of this Continent. If no "killing bottle" is available soak the *body* (never mind the head) in clean petrol or benzene to kill the animal.

I must gratefully acknowledge facilities and other assistance granted in 1953 at The British Museum by Mr. W. H. T. Tams and Mr. D. S. Fletcher; Mr. W. J. B. Crotch, also in London; Mr. T. H. E. Jackson for his collection of *Saturniidae* which formed the preliminary nucleus of The Coryndon Museum collection only a few years ago; Dr. V. G. L. van Someren for his kindness in letting me browse through his collection; Mr. J. G. Williams and others for assistance in various respects, particularly with common names; Mr. C. Howard of Kitale, Dr. E. Burt of Shinyanga, Mr. B. T. Parsons of Makueni and Mr. D. G. Sevastopulo of Kampala, for material; and Mr. P. R. O. Bally for his patience and stamina in surviving the photographic trials.

Lastly, I must acknowledge the source of certain illustrations. Those taken from Seitz' volume XIV are mentioned on the respective plates. *Antistathmoptera daltonae* is from Tams' paper in *Stylops*. These are of species as yet unrepresented in the Coryndon Museum.

CLASSIFICATION

Family SATURNIIDAE

Beginners can try to identify species just from the photographs. Others may attempt to follow the specific keys, which are presented here with reserve. Subfamily and generic keys are omitted as they involve structural problems. The size of the moth is given for popular convenience in inches, just the length of one forewing from base to apex. Males can be distinguished by their antennae being more broadly feathered than those of the females.

Subfamily Attacinae

The "Atlas Moth" group, related to the giant *Attacus* of Asia, in which females may occasionally measure as much as a foot or more across the wings.

Genus *Epiphora* Wallgr.

Key to species of this genus: if the glass spots are shaped like crescents or kidneys go straight to subgenus *Drepanoptera*. If they are circular or elliptical, they will be subgenus *Epiphora*.

Subgenus *Drepanoptera*. (Roths).Key to *Drepanoptera*:-

1. Hindwing mainly white: (the species will be) . . . *albida*
alternatively, Hindwing mainly grey or brown: (go on to number) . . . 2.
2. Forewing (upperside) without a white streak at base; hindwing (underside), veins conspicuously paler than ground colour . . . *antinorii*
Forewing above, with an oblique white basal streak; veins on underside not clearly mapped out . . . 3
3. Glass spot on hindwing heart-shaped. Underside with basal area grey-brown, the boundary of it fairly straight nearly to the forward (costal) margin . . . *rectifascia*
Glass spot on hindwing narrow, more kidney-shaped; underside at base deep brown, bounded by a line curved strongly inwards just above the glass spot . . . 4
4. Median line on upperside of forewing strongly in-curved below the glass spot. Wings only weakly falcate . . . *pelosoma*
Median line of forewing fairly straight. Wings strongly falcate . . . *vacuna*

Subgenus *Epiphora*Key to *Epiphora*:-

1. No distinct white markings on upperside—merely a faint pale outer line. All glass spots very circular . . . *lugardi*
With some distinct white markings on the wings. Glass spots on forewing elliptical . . . 2
2. Outer line on forewing fairly straight towards forward margin (costa). Ground colour of hindwing white from base to beyond glass spot . . . *bauhiniae*
Outer line on forewing curves inwards towards costa . . . 3
3. Ground colour hindwing to beyond glass spot largely white (not so uniformly as in *bauhiniae*) . . . *atbarina*
White markings hindwing consist of the white outer line, which curves round almost in a circle to the basal area; the ground colour otherwise finely speckled with white dots . . . *mythimnia*

Epiphora rectifascia Roths. STRAIGHT BARRED ATLAS.

Plate 1.

Ground colour grey-brown, finely speckled with white. Underside rather similar to upperside. Hindwing above with pear-shaped yellow marginal spots. Forewing $2\frac{1}{2}$ to 3 inches long.

In Coryndon Museum from Kitale District and Kakamega in Kenya; Beni in the Belgian Congo. It is also known from West Africa.

Epiphora albida (Druce). WHITE ATLAS.

Plate 2.

Ground colour somewhat reddish-brown. Hindwing mainly white; marginal ocellate yellow spots larger than in *rectifascia*. Underside like upperside. Forewing 3 - $3\frac{1}{4}$ inches long.

In Coryndon Museum from Kitale and Uganda. Also occurs in West Africa.

Epiphora vacuna (Westw.) AFRICAN ATLAS.

Plate 2.

Ground colour brown or grey-brown, strongly speckled with white. Marginal yellow spots on hindwing broad. Underside hindwing deep brown all over basal and medial areas, the boundary curving round towards the base above the glass spot. This dark area contrasts strongly with the pale outer area. Forewing $3\frac{1}{4}$ - $3\frac{1}{2}$ inches.

Subspecies *vacuna* Westw. is about $3\frac{1}{4}$ inches; the white basal streak on forewing short and narrow. In Coryndon Museum from Katwe, Uganda.

Subspecies *plötzii* Plötz is larger. White basal streak on forewing broad and long, reaching to the outer line. In Coryndon, from Kakamega (Kenya). Also known in West Africa.

Subspecies *manowiensis* Geschw. As large as *plötzi*. Outer whitish line on forewing straighter. Marginal yellow spots on hindwing very small, not broad as in *plötzi*. In Coryndon Museum, from Amani (Tanganyika).

Epiphora pelosoma Roths. DUSKY ATLAS.

Plate 2.

This species appears to be very close to *vacuna* but with wings less falcate, shaped more like *antinorii*. The outer line is in-curved below the glass spot on forewing. It was described from East Africa and specimens I have allocated to it in Coryndon Museum are from Kakamega (Kenya) and Beni (Belgian Congo). The underside is similar to *vacuna*, but the build is like an enlarged *antinorii*.

Epiphora antinorii Oberth. ANTINORI'S ATLAS.

Plate 1.

Ground colour uniform brown or grey-brown, not speckled with white. Pale outer line well separated from the glass spots. Underside more distinctly reddish, the veins standing out whitish. Forewing 2 - 2½ inches.

In Coryndon Museum, from Amani (Tanganyika), Nairobi, Kitale and the Aberdare Mountains in Kenya. Also known in West Africa.

Epiphora lugardi Kirby. LUGARD'S ATLAS.

Plate 3.

Somewhat uniform dark reddish- or purplish-brown. Glass spots circular on all wings. Outer line faint. Unlike all the others in this *Epiphora* genus it has no white band at the base of the abdomen. Forewing 1½ - 2¼ inches long. In Coryndon Museum, a series from Mtito Andei and a few from Makuani, Kenya.

Epiphora mythimnia (Westw.) WHITE RINGED ATLAS.

Plate 2.

Ground colour brown, finely speckled with white. Glass spots rather elliptical. Hindwing with an almost circular white band. Forewing 2¼ - 2½ inches. In Coryndon Museum, from Nairobi; also known in South Africa and Rhodesia. The caterpillar feeds on *Croton* and *Zizyphus*.

Epiphora bauhiniae (Guer.) SOUTHERN ATLAS.

Plate 3.

Ground colour brown on forewing, less densely speckled with white than in *mythimnia*. Basal part of forewing and most of hindwing white. Forewing 2 - 2¼ inches.

In Coryndon Museum, from Southern & Northern Rhodesia. Also found in South Africa and Southern Tanganyika; and probably racially allied to *atbarina*. The caterpillar is whitish with coloured tubercles which are blue and orange-red; small red dots at sides. It feeds on *Zizyphus*.

Epiphora atbarina Butl. NORTHERN ATLAS.

This is more or less intermediate between *mythimnia* and *bauhiniae*. The outer line is in-curved on the forewing above the glass spots as in *mythimnia*; the hindwing is largely white, but in the basal area not so completely as in *bauhiniae*. The outer line on the forewing in *bauhiniae* is not usually so in-curved. Forewing of much the same dimensions as *bauhiniae*. In Coryndon Museum, from Kapenguria, Kenya.

In the Sudan and the bush country of the Suk, Northern Uganda, there is the race *sudanica* Le Cerf, represented in Coryndon from near Khartoum: the ground colour at the base of the wings is more reddish, while in *atbarina* it is dark maroon.

Subfamily Saturniinae

The vast majority of African Emperors belong here.

Argema Wallgr.

Easily recognized as large green moths with long tails on hindwing.

Key to *Argema*:-

- 1.—Body white, with brown stripe down the thorax; veins on wings broadly whitened; a brown medial band . . . *besanti* Rebel
- Body yellow and brown, without thoracic stripe; veins not whitened, and no brown median bar . . . *mimosae* Bsd.

Argema mimosae (Bsd.) AFRICAN MOON MOTH.

Plate 4.

This is the larger species; body yellow and brown, wings mainly plain green. Fringes of wings brown or yellowish. Hindwing with long tail. Forewing $2\frac{1}{2}$ - $2\frac{3}{4}$ inches. In Coryndon Museum from Tanga and Morogoro (Tanganyika); Southern Rhodesia. Also known in Southern Kenya and South Africa. The caterpillar is green with silvery markings. Feeds on *Sclerocarya*.

Argema besanti Rebel WHITE-VEINED MOON MOTH

Plate 4.

A smaller species. Body and wing-veins white. Forewing with brown median band. Fringes of the wings white, tipped all the way along with brown. Forewing $1\frac{1}{2}$ - $1\frac{3}{4}$ inches. Specimens in Coryndon, from Mandera and Mulka Murri, far up near the northern frontier of Kenya, probably represent a distinct race; one female from Wajir, Kenya, is probably more like the type female which was described from South Ukambani, near the Kibwezi area of Kenya. In the Wajir example the markings are less intense, the eyespot is not so thickly linked to costa on forewing, and the tails are longer and straighter. The green colour is more bluish-green than in the northerly examples which are more green or yellowish-green. The cocoon is a silvery netted structure, as in *mimosae*.

Antistathmoptera daltonae Tams FROG FOOT.

Plate 3.

A light yellowish-brown, long-tailed species with irregular margins. Abdomen and outer part of forewing tinted with pale orange. The tail is extraordinarily like the hindleg of a frog. Forewing $2\frac{1}{2}$ inches. No specimens in Coryndon Museum. The single type female was captured by a Mrs. Dalton near Amani, Tanganyika. Mr. C. Howard was fortunate in taking a second example at Amani in April 1955. (a male.)

Eudaemonia argiphontes Kirby. SMALL LONG-TAILED EMPEROR.

A small species, brown in colour, with irregular glass spots on each wing. Forewing about $1\frac{1}{4}$ inches. No specimens in Coryndon Museum, but we show the West African *E. brachyura* Drury, which has a uniform pink colour (Plate 3). Van Someren has a pair of *argiphontes* from Bwamba Forest, Western Uganda, which are larger than typical ones, with more conspicuous glass spots. It is probably *E. argiphontes* subspecies *barnsi* J. & T., which was described from Ituri, in the Congo.

Bunaea alcinoe (Stoll) COMMON EMPEROR.

Plate 4, 22.

A moderate to large species, varying in colour from orange-brown to reddish- or purplish-brown, suffused in places with whitish. The glass spot on the forewing is large and angular. The eyespot on the hindwing is broadly orange in the middle, ringed with black and, on the outside, a whitish circle. The forewing is very slightly falcate in the male. The inner line on the forewing is either irregular or rather straight, the outer line straight, both lines whitish-edged. Forewing 2 - 3½ inches. Several forms or races have been named but, at least in East Africa, there seems to be no constancy in a given area. So we will not mention the names. Perhaps different food plants may induce different colour forms. It is a very common species, widespread in Africa. In Coryndon Museum from various parts of Kenya, right up to Marsabit; Amani (Usambara Mountains), Tanganyika; and from Southern Rhodesia.

The caterpillar is a conspicuous black creature with long spines which are normally ivory white, occasionally orange; and with orange spots marking the breathing pores along the sides of the body. It feeds on *Cussonia*, *Ekebergia* and, perhaps *Croton*.

In Abyssinia there is a related insect described as *Bunaea tricolor* Roths., having a bluish-grey ground colour. I have seen no examples of this species.

Imbrasia Hbn.

A small genus erected for a small, variable and very common species, *Imbrasia epimethea*. It also includes some very much larger species, quite dissimilar in general appearance from *epimethea*. Perhaps they should be moved to another group, but one feature they all tend to have in common is the development of either an angle or a short tail near the middle of the hindwing-margin in the male.

Key to *Imbrasia*:-

1. Small moths, forewing less than 2½ inches long; apex of forewing not falcate; hindwing of male with short tail . . . *epimethea* 2
Large moths, forewing at least 3 inches; apex falcate . . .
2. In male, the margin of forewing wavy; in female, apex of forewing angular, not rounded. Ground colour dark reddish-brown . . . *ebilis* 3
In both sexes the margin clean-cut, not wavy; apex rounded; ground colour normally not dark reddish . . .
3. Forewing without coloured eyespot (but the glass spot may be large in female). Hindwing with short tail in both sexes . . . *deyrollei*
Forewing with coloured eyespot around the large glass spot. Hindwing in male only slightly angled (not tailed), in female rounded . . . *macrothyris*.

Imbrasia epimethea (Drury). CONFUSED EMPEROR.

Plate 5.

A very variable insect which could be thought to consist of more than one species; but there seem to be all gradations between these variations. Only detailed anatomical study or extensive breeding would decide this.

Ground colour very variable, pale brown, deep brown, red or grey-brown. The lines suffused with whitish, the inner zigzag, the outer straight. Near margins of wings there is a pale band which is toothed on its outer edge. Forewing with a moderate or large glass spot but no coloured eyespot. Eyespot on hindwing orange in centre, ringed with black, red and whitish. Forewing very slightly or not at all falcate. Hindwing in male angled or short-tailed in middle of the margin; slightly angled in the female (but almost indiscernibly so in some examples). Underside in both sexes dusted with short black hair (occasionally brown) and scales, scattered all over both wings. Forewing 1½ - 2½ inches.

This species can easily be confused with some *Nudaurelia*, but the tail (in the male) is quite distinct in *epimethea*, and it is not present in the *Nudaurelia* group. The female is often more difficult to distinguish. It could be confused, for instance, with *Nudaurelia anthina*; but the black

hair on the underside seems to be almost constant in *epimethea* and gives a ready means of quick separation. An insect named *Nudaurelia affinis* Bouv. appears to be one of the female varieties of *I. epimethea*.

Various so-called races have acquired names and the one occurring in East and South-East Africa has been called race *erili*. Reviewing the long Coryndon Museum series, however, from Kenya, Tanganyika, Uganda and Rhodesia, it does not seem possible to separate them into such races. Perhaps the form, race (or even species?) *longicauda* might be distinct. Dr. Van Someren has a male of this which he took at Suna, South Kavirondo Kenya. It has a longer tail than the normal *epimethea* or *erili*.

The species also occurs in South and West Africa. The caterpillars feed on *Brachystegia* and *Berlinia* among other plants.

Imbrasia deyrollei Thoms. GIANT EMPEROR.

Plate 6.

Forewing falcate in both sexes, more so in the male; hindwing tailed, also more strongly in the male. Ground colour plain light or dark brown, occasionally reddish, in the male slightly suffused with whitish at inner and outer lines. Forewing with minute glass spot in male, a large one in female. Eyespot on hindwing black in centre, surrounded by red and pink rings. Forewing $3\frac{1}{2}$ - 4 inches. This is the largest of our Emperors. In the Coryndon Museum from Amani, Tanganyika, and Busia on the Uganda-Kenya border. It also occurs in Nyasaland, Congo and West Africa.

Imbrasia eblis (Streck). WAVY-EDGED EMPEROR.

Plate 6.

Apex of forewing falcate, rounded in male, angled in female. Margin of forewing wavy in male; hindwing angled in middle in male, rounded in female. Ground colour dark reddish-brown. No eyespot on forewing; on hindwing it is brown in centre, then black, orange-red, whitish. Forewing 3 - $3\frac{1}{2}$ inches. In Coryndon Museum, from Kampala, Uganda. It occurs in the Congo and West Africa.

Imbrasia macrothyris (Roths.) LARGE-EYED EMPEROR.

Plate 6.

Apex of forewing falcate and rounded in both sexes. Ground colour of forewing brownish at base and in outer area, sprinkled with yellow or red hair; medial area reddish, strongly suffused with whitish. Inner line sharply angled, middle line irregular, outer line gently curved. Forewing with very large glass spot. Eyespot on hindwing with black, red and whitish rings. Forewing $3\frac{1}{2}$ - $3\frac{1}{2}$ inches. In Coryndon from Southern Rhodesia. It also occurs in South and West Africa and Tanganyika. Dr. Ashford-Hodges has found it near Morogoro, in Tanganyika.

The caterpillar is light bluish-green and mauve; the tubercles bearing pale yellow spines. It feeds on *Brachystegia*.

Nudaurelia Roths.

This might be called an "omnibus" genus by some writers. There are certain venational differences which make it separable into groups (genera or subgenera) such as *Gonimbrasia*, *Aurivillius* and *Thyella*. It has, on the other hand, some uniformity of shape and markings and although these features are not fundamental it is more convenient in this paper to retain them in the one group.

To make out a simple key for all these species is a little difficult. It is advisable first to split them up into sections on purely superficial characters.

Key to *Nudaurelia* sections and most species:—

A. *White-collared species*: a white collar on front of thorax.

This section can be divided into two sub-sections,

(a) *Zambezina* group,

(b) *belina* group

Alternatively, there are those, B, without a white collar on front of thorax. These "collarless" ones fall into various sub-sections, (c) *arata* group. (d) *oubie* group, (e) *macrophthalma* group, (f) *dione* group, (g) *gueinzii* group.

A. *White-collared Species* (subsections a and b above) :—

1. Forewing with whitish submarginal band or suffusion. Inner line straight. Small species forewing $1\frac{1}{4}$ - $2\frac{1}{4}$ inches long . . . 2
Forewing without any submarginal markings . . . 3
2. Ground colour yellow. Eyespot on hindwing yellow, black and whitish . . . *rhodophila*
Ground colour coppery or greenish. Eyespot on hindwing brown, black, greenish and whitish . . . *sonthonnaxi*.
3. Apex of forewing distinctly falcate in male. Ground colour decidedly green. Forewing with distinct coloured eyespot . . . *zambesina*
Similar to *zambesina* but the ground colour brownish . . . *said*
Apex not falcate, or if slightly falcate then the ground colour is not green; in the examples that are green, the forewing has no coloured eyespot . . . 4
4. Forewing with distinct coloured eyespot; ground colour yellowish, densely speckled with black. Inner line very zigzag . . . *tyrrhea*
Forewing without coloured eyespot. Inner line not zigzag . . . 5
5. Inner line fairly straight, at most slightly kinked . . . 6
Inner line distinctly angled . . . 7
6. Lines on forewing usually strongly white-edged; medial area often suffused with white. Ground colour variable. Inner line only slightly oblique . . . *belina*
Lines scarcely or not white-edged. Wings vary from fawn to reddish. Inner line very oblique . . . *chevalia*
7. Ground colour yellow, orange or reddish, occasionally greenish-yellow. Forewing usually just over 2 inches . . . *conradsi*
Ground colour dark greenish. Generally slightly smaller, forewing under 2 inches . . . *staudingeri*

B. *Species without White collar.*

We will separate off (d), the *oubie* group, and lump the other groups together.

- (d) *oubie* group—both wings with broad black marginal border, either a continuous band or a series of square spots separated by pale veins.

(e) to (g) groups.—No black border to the wings.

(d) *oubie* group. (No white collar, but a broad black border to the wings):—

1. The black border continuous and very broad. Remainder of each wing yellow in female, or the hindwing red in male . . . *dolabella*
Marginal black border split up by pale veins . . . 2
2. Ground colour plain rose red from base to outer line; outer line very wavy . . . *arabella jacksoni*
Ground colour yellow, orange or slightly pinkish, strongly speckled with black . . . *oubie*.

(e) to (g) groups.

1. Both wings with fine brown, very zigzag median line, crossing the wing at the eyespot or just behind it. Eyespot on hindwing with large black, angular pupil, with a clear slit near its inner edge . . . *arata* group (c) . . . *arata*.
No median line, or only a diffuse dark band, not zigzag. Pupil on hindwing eyespot not formed as in *arata* . . . 2
2. Apex of forewing not falcate, but broadly rounded; forewing with well developed coloured eyespot. Inner line distinctly angled in middle. No submarginal markings. . . *macrophthalma* group . . . 3
Apex falcate or less broadly rounded. If there is a coloured eyespot on forewing then the inner line is either irregular or fairly straight but not distinctly angled . . . 6
3. Ground colour dark- or reddish-brown; the outer line is midway between eyespot and margin, or else nearer to the eyespot. Forewing over 2 inches long . . . 4

- Ground colour yellow or pinkish, not brown. Usually smaller . . . 5
4. Ground colour blackish-brown; outer line much nearer eyespot than margin; pupil of eyespot reddish . . . *phidias*
Ground colour reddish-brown; outer line almost midway between eyespot and margin; pupil of eyespot on hindwing yellowish . . . *licharbas*.
5. Outer line normally nearer margin than to eyespot. Small species, forewing usually under 2 inches . . . *macrophthalma*
Outer line mid-way between eyespot and margin. Forewing 2 inches or more; . . . *hersilia*
6. Forewing with well developed eyespot of several coloured rings (small in *wahlbergi*). Ground colour mainly yellow—*dione* group— . . . 7
Forewing without proper eyespot, at most an insignificant single ring round the glass spot—*gueinzii* group . . . 12
7. No submarginal markings . . . 8
With submarginal markings . . . 9
8. Ground colour deep yellow. Forewing about $2\frac{1}{2}$ inches . . . *richelmanni*
Ground colour pale canary yellow. Larger, the forewing over $2\frac{1}{2}$ inches long . . . *krucki*
9. Submarginal markings in form of a distinct red band. Hindwing bright red from base to outer line . . . *anna*
Submarginal markings in form of an indistinct, diffuse, wavy reddish band. Hindwing yellow or suffused with brownish-red . . . 10
10. Ground colour finely speckled with brown. Eyespot of forewing small, much smaller than on hindwing . . . *wahlbergi*
Not finely speckled brown. Eyespot forewing nearly as large as on hindwing . . . 11
11. Lines on forewing thin and sharp. Median area not suffused with reddish. Eyespots surrounded by narrow pink and red rings . . . *dione*
Lines on wings thick and suffused towards and across medial area with red. Eyespot of hindwing surrounded by broad pink and narrow red ring . . . *macrops*
12. With a toothed submarginal band, which is red or pale . . . 13
Without any definite submarginal markings . . . 15
13. Apex falcate in male, rather pointed. Eyespot on hindwing with the black ring not broader than the other rings. Forewing over $2\frac{1}{4}$ inches. Inner line zigzag . . . 14
Apex not falcate. Black ring of eyespot on hindwing broader than the other rings. Forewing 2 inches or less in length. Inner line a double loop . . . *rhodina*
14. Ground colour uniformly yellow or reddish. Eyespot on hindwing without a deep red ring . . . *anthina*.
Ground colour yellow, suffused with red in medial area. Hindwing eyespot with deep red ring . . . *emini*
15. Centre of eyespot on hindwing greyish. Ground colour forewing light pinkish-brown . . . *nictitans*
Centre of eyespot on hindwing bright yellow. Ground colour variable, reddish, dark brown, yellow or orange . . . 16.
16. Inner line of forewing convex, in form of double loop. Forewing less than 2 inches long . . . *reducta*
Inner line somewhat zigzag or straightish. Forewing over 2 inches long . . . 17
17. Forewing male distinctly falcate and pointed. Forewing $2\frac{3}{4}$ - 3 inches long . . . *myrtea*.
Forewing scarcely or not at all falcate; when falcate the apex is broadly rounded, not pointed. Forewing $2\frac{1}{4}$ - $2\frac{3}{4}$ inches . . . *gueinzii*

The above key has been attempted for simple identifications and is not based on scientific relationships. For instance, it places *wahlbergi* in the *dione* group, whereas it is probably nearer *gueinzii*; and *emini* in the *gueinzii* group, instead of near *macrops* of the *dione* group.

Most of the named varieties within a species will be omitted in the brief descriptions that follow.

A. *White-collared species.*(a) *Zambesina* group*Nudaurelia zambesina* (Walk.) ZAMBESI EMPEROR.

Plate 7.

Ground colour green or olive green, suffused with white and finely sprinkled with black dots. The lines on forewing thin and black; inner line convex and very irregular, outer line straight in direction but often somewhat wavy. Base of hindwing purplish or reddish in forward part. Eyespot on hindwing ochreous—or greenish-yellow in middle, ringed with black, greyish-yellow and white. A large species, forewing $2\frac{1}{2}$ - 3 inches long. Forewing falcate in male.

In Coryndon Museum from Mombasa, Kenya; Amani, Shinyanga and Ukerewe Island, Tanganyika. Also known in Southern Africa.

The caterpillar is black with blue-grey and yellow spots; breathing-pores fringed with red hair. Feeds on *Mangifera* and *Poinciana*.

Nudaurelia said (Oberth.) TAWNY EMPEROR.

Very similar in size and markings to *zambesina*, but the ground colour is reddish-brown. Eyespot of hindwing yellowish-brown, with black, pink and whitish rings. It is recorded from Tanganyika but I have seen no examples. Could it perhaps be a form of *zambesina*?

Nudaurelia tyrrhea (Cr.) ZIGZAG EMPEROR.

Plate 7.

Ground colour forewing and margin of hindwing yellowish, very thickly sprinkled with black. Lines on forewing black, edged with white. Inner line extremely zigzag, the outer one very wavy. Basal portion of hindwing yellowish-brown and red. Eyespot on hindwing may have a greyish or reddish or even blackish centre, the outer rings black, yellowish and white. Forewing $1\frac{1}{2}$ to $2\frac{1}{2}$ inches. Forewing not falcate.

In Coryndon Museum from Elburgon, Nairobi, Aberdares and Kitale, all in Kenya. It ranges from South to East Africa. A specimen from Limuru, near Nairobi, is exceptionally dark.

(b) *belina* group.*Nudaurelia belina* (Westw.) ANOMALOUS EMPEROR.

Plate 8.

Ground colour very variable, yellowish-orange, greyish-green or shades of red. The lines white and black, the inner line fairly straight. No eyespot on forewing; the glass spot very small, either plain or thinly ringed. Eyespot on hindwing orange in middle, with rings of black, yellowish and white. Forewing $2\frac{1}{4}$ - $2\frac{3}{4}$ inches (dwarfs may measure 2 inches). In Coryndon Museum from Kacheleba (Uganda); Amani, Dar-es-Salaam and Ukerewe Island (Tanganyika); and from Southern Rhodesia. Distributed also in South and West Africa.

Caterpillar black with greenish-yellow dots; short reddish-brown spines; a few sparse hairs, white at the tip. Feeds on *Terminalia* and *Copaifera*.

A greenish form of moth, perhaps belonging to this species, but with the inner line on forewing more angled, has been bred at Machakos (Kenya) from *Spirocarpa*, by Mr. B. T. Parsons.

Nudaurelia chevalia Stoneham STONEHAM'S EMPEROR.

Plate 8.

Ground colour pale yellowish-brown, light brown, reddish- or orange-brown. It is most readily distinguished from *belina*, *gueinzii* and others, by the inner line on forewing which is very nearly straight and strongly oblique; and the outer line is moderately thick; these lines are grey and whitish. No eyespot on forewing, only a tiny glass spot. Eyespot on hindwing yellow, black, yellow and whitish (or pink) from centre outwards. Forewing $2\frac{1}{2}$ - $2\frac{3}{4}$ inches. In Coryndon Museum from Kitale. Mr. C. Howard has a good series from the same locality.

Nudaurelia conradsii Rbl. CONRAD'S EMPEROR.

Plate 7.

Ground colour variable, greenish-yellow, orange or reddish. Hindwing usually red at base, sometimes purplish. Inner line on forewing almost right-angled; outer line straight, narrow, purplish-brown and whitish. Eyespot on forewing very small; on hindwing large, with orange centre, ringed with black, pink (or yellow) and whitish. Forewing usually about 2 inches long, but varying from $1\frac{3}{4}$ to $2\frac{1}{4}$ inches. It would appear that *N. jefferyi* (Bouv.) is the same species; there is the same range of variation in a series of *conradsii* from Ukerewe Island (Tanganyika) and of *jefferyi* from Kitale (Kenya) where the latter originally came from. In Coryndon Museum from Nakuru, Kitale and Kakamega (Kenya); Ukerewe Island. It also occurs in Rhodesia.

The following insect is also probably the same species.

Nudaurelia staudingeri (Aur.) STAUDINGER'S EMPEROR.

Plate 7.

Ground colour distinctly green; base of hindwing purplish. Eyespot on hindwing orange, black, grey and white. Forewing $1\frac{3}{4}$ - 2 inches. In Coryndon Museum there are only a few examples from Kericho (Kenya); but Howard's series from Kitale show all gradations from *conradsii* to *staudingeri* and it does not, in fact, seem possible to draw the line. This insect is recorded from Congo and West Africa. If there should be more uniformity in series from West Africa then it might be assumed that *staudingeri* is a central and western race of *conradsii*.

Nudaurelia rhodophila (Walk.) STRAIGHT-BARRED EMPEROR.

Plate 7.

Ground colour yellow; lines straight on forewing, or the outer one a little curved; both lines suffused with whitish on outer edge. No eyespot on forewing; on hindwing it is yellow, black and broadly ringed with whitish. Forewing $1\frac{3}{4}$ - $2\frac{1}{4}$ inches. Perhaps *sonthonnaxi* is a variety of the same species, but anatomical examination may decide this. In Coryndon Museum from Kitale. This insect (or the next one) is said to occur in Central and West Africa.

Nudaurelia sonthonnaxi Weym. SONTTHONNAX' EMPEROR.

Plate 7.

Very near *rhodophila* but the ground colour is said to be coppery-brown. A specimen in Coryndon Museum which may belong here is more greenish in colour. The whitish submarginal band of *rhodophila* is here very diffuse. Eyespot on hindwing brown in middle, ringed with black, then a ring of the ground colour, and lastly pinkish-white. Forewing 2 inches. This specimen is from Sango Bay in Western Uganda.

B. No White Collar.

(c) *arata* group.*Nudaurelia arata* (Westw.) CAT'S-EYED EMPEROR.

Plate 8.

Ground colour yellow to pinkish. Lines on forewing grey, inner line irregular, median line fine and extremely zigzag, outer one almost straight on forewing. Eyespot well developed on forewing, with fine black, grey and pinkish rings. On hindwing it has a large black angular pupil, edged inwardly by a fine clear line. Forewing $1\frac{3}{4}$ - $2\frac{1}{4}$ inches. In Coryndon Museum, from Nairobi, Machakos (Kenya); Amani (Tanganyika). Also known in Southern and Western Africa.

Larva pale green with gold tubercles; gold spots on the sides. Feeds on *Piptadenia*.

Nudaurelia oberthueri Bouv. OBERTHUER'S EMPEROR.

Evidently closely related to *arata*; differing in that the teeth of the zigzag median line of the hindwing reach inwards below the eyespot—the median and inner lines converging. Described from Tanganyika; but no examples in Coryndon Museum.

(d) *oubie* group.*Nudaurelia oubie* (Guer.) VEINED EMPEROR.With races or forms named *zaddachi* Dew, *rothschildi* Le Cerf, and so on.

Plate 9, 23.

A very variable species. Ground colour, yellowish, orange or pinkish, thickly sprinkled with black. Large blackish submarginal patches separated by pale veins. Inner line on forewing angled; outer line curved and parallel to margin. Apex very rounded. Forewing $1\frac{1}{2}$ - $2\frac{1}{4}$ inches. Several forms or races have been named. In *oubie* race *oubie* the dimensions are small, the ground colour yellow: in Kenya this is commoner in the grasslands of South Kavirondo, according to van Someren. The race *rothschildi* is larger, with ground colour contrastingly paler than the dark markings. In *zaddachi* the general colour is orange. Race *rothschildi* is the prevailing one in the highlands of East Africa, *zaddachi* in the low bush veld. Other forms are so liable to intergrade that it is not worth mentioning them.

It is common and widespread in Kenya, Uganda, Tanganyika and Rhodesia; the Museum also has examples from Nigeria. In Rhodesia, *oubie* and *zaddachi* occur in bush country. Perhaps as Bouvier suggests, certain of the forms may be specifically distinct. The caterpillar feeds on *Euclea*.

Nudaurelia dolabella (Druce) BLACK-EDGED EMPEROR.

Plate 8.

Forewing yellow, hindwing yellow in female, red in male; both wings with very broad, black, continuous border. Forewing without eyespot and only a very tiny glass dot; hindwing with the eyespot yellow ringed with black. Inner line black and very irregular, usually thick. Forewing 2- $2\frac{1}{4}$ inches. In Coryndon Museum from Dabaga, Morogoro and Rungwe Mt. in Tanganyika; also recorded from Nyasaland. The males fly by day, in sunshine, and the females are also stirred up readily in the daytime.

Nudaurelia arabella (Aur.) SPOTTED BORDER EMPEROR.

Plate 8.

In East and Central Africa the prevalent form is race *jacksoni* Jord. This has a rich red or pink ground colour, from base to the wavy black outer line; inner line pale pink. A marginal band of squarish black spots between the yellow veins. Eyespot well developed on forewing and hindwing; yellowish, ringed with black, red, pale pink and another red circle. Forewing $2\frac{1}{4}$ - $2\frac{1}{2}$ inches.

Race *arabella* of Southern Africa has the ground colour yellow, suffused with red at the base; inner line of forewing black.

In Coryndon Museum, there is *jacksoni* from Kitale and Kapsabet (Kenya); Ukerewe Island (Tanganyika); *arabella*, from Natal.

(e) *macrophthalmal* group.*Nudaurelia macrophthalmal* (Kirby) SMALL SCALLOPED EMPEROR.

Plate 9.

Forewing yellow, hindwing red. Eyespot large on both wings, yellowish in centre, ringed with black, red and pinkish-white. Inner line angled. Outer line closer to margin than to the eyespot. Underside of forewing usually suffused with pink. In one form of the female both wings may be pink. Forewing $1\frac{1}{2}$ -2 inches. The species is very similar to *hersilia*. In Coryndon Museum, from Mwanza (Tanganyika) and Gulu (Uganda). It occurs in West Africa.

Nudaurelia hersilia (Westw.) SCALLOPED EMPEROR.

Plate 9.

Ground colour yellow and red; in most respects similar to *macrophthalmal* but the outer line is about half-way between margin and eyespot; consequently not so near the border as in the previous species. Underside of forewing at base sometimes suffused with pink. Forewing $2\frac{1}{2}$ inches. In Coryndon Museum, only from Southern Rhodesia; but it is found in South, East and West Africa.

Nudaurelia licharbas (M. & W.) RUFOUS EMPEROR.

Plate 9.

Very similar to *macrophthalma* and *hersilia* but larger, with the ground colour reddish-brown. Markings as in the last two species but the outer line is either midway between margin and eyespot or nearer the eyespot. Forewing 2-2½ inches. In Coryndon Museum, from Ukerewe Island, Tanganyika. Known from South, East and West Africa.

Caterpillar green; spines brown with black tips, ringed with blue at the bases.

Nudaurelia phidias (Weym.) CHOCOLATE EMPEROR.

Plate 9.

Yellowish-brown, so densely speckled with black that the wings appear to be blackish-brown. The lines are broad yellow or whitish, edged with black, shaped as in *licharbas*, but the outer line much nearer to eyespot than to margin. Eyespot on forewing dark brown, ringed with black and dark yellow; on hindwing reddish-brown, encircled with black and red, and surrounded by a pinkish-white suffusion. Forewing 2½ inches. Recorded from Tanganyika, but not represented in Coryndon Museum.

Nudaurelia aurantiaca Roths.

Said to be dark orange-yellow; inner line black, white-edged and double-angled. Outer line also black, edged with white; nearer eyespot than margin. Eyespot on forewing merely brown and black; on hindwing very large, black, ringed with red, pinkish-white and another red circle. It is larger than *licharbas* and also differs in ground colour and the shape of the inner line. I have seen no specimens. It was described from Nyasaland and would presumably occur at least in Southern Tanganyika. Perhaps *richelmanni* is the same species.

Nudaurelia mpalensis Sonth.

Described as pale brownish-yellow with pinkish-white shading.

Inner line angled as in *licharbas*, fine and reddish-brown in colour. Outer line blackish-brown edged with pink, situated nearer eyespot than margin. Apex of forewing suffused with pink. Eyespot on forewing yellow, ringed with black and reddish-brown; on hindwing black, with rings of red and pink. Evidently also a large species. No specimens available; described from Tanganyika.

Nudaurelia rectilineata Sonth. STRAIGHT-LINED EMPEROR.

Reddish-yellow; lines very slender, dark brown edged with pink. Inner line straight; outer straight in direction, but wavy and runs nearly to apex of forewing. Eyespot on forewing small; on hindwing yellow, ringed with red, black, red, white and again a red circle. Smaller than the last three species, and although it has certain features of the *macrophthalma* group, it is evidently not a close ally, because of the different formation of the lines on the forewing. No specimens in the Coryndon Museum. Another Tanganyika species.

(f) *dione* group.*Nudaurelia dione* (F.) GOLDEN EMPEROR.

Plate 11

Ground colour deep or chrome yellow; a red or pink patch at base of forewing. Apex in male falcate. Lines red or purplish, the inner very irregular, the outer line straight. Eyespots well developed on all wings, although sometimes smaller on forewing: the centre yellow, the rings black, pink and red. Forewing 1½-2½ inches. In Coryndon Museum, from Kitale (Kenya); Mbale, Jinja, Kampala and Entebbe (Uganda.)

Caterpillar black, with yellow-tipped spines and sparse, short hairs.

Nudaurelia macrops Rbl. LARGE GOLDEN EMPEROR.

Plate 10.

Deep yellow, the lines dark, thick, smudged towards the middle of the wings, the medial area of the forewing mainly reddish. Inner line straight and oblique. The apex in female rather narrow, rounded and slightly falcate. Eyespot well developed on all wings: on hindwing it is chrome yellow, ringed with black, a very broad grey area and a thin outer red ring. Forewing 3-3½ inches. It occurs in East and West Africa but there are no specimens in Coryndon Museum.

Rebel, who described it, and Gaede (in Seitz' Vol. XIV) recorded this insect as a race or form of *emini*; but with the straight inner line and large eyespot on the forewing it would appear to be distinct. Dissection or breeding might decide.

The yellow species, *N. carnegiei*, is readily distinguished from *macrops*, since the medial area is grey instead of red and the apex is broadly rounded.

Nudaurelia lutea Bouv., from the Congo, is another large species near *dione*, with canary ground colour.

Nudaurelia krucki Her. KRUCK'S EMPEROR.

Plate 10, 24.

Ground colour cadmium yellow (old, rubbed specimens appear pinkish). Apex of forewing broad and falcate in male, sometimes falcate in female. Lines reddish and grey; the inner one almost straight but oblique; the outer curved. Eyespot well developed on forewing and hindwing: yellow, ringed with black (very finely on forewing), pink and red. Forewing 2½-3½ inches. In Coryndon Museum, a long series from Nairobi, Kitale and Isiolo, in Kenya.

The caterpillar is black, speckled with greenish-yellow; with short black spines; breathing-pores orange. Feeds on "Weeping Pepper" tree (*Schinus*) and on *Acocanthera*.

Nudaurelia carnegiei Janse. CARNEGIE'S EMPEROR.

Described from Selukwe, Southern Rhodesia, this is closely allied to *krucki*. It is about the same size, yellow, speckled with grey-brown, the medial area at least partly shaded with grey. The eyespot on the hindwing is yellow, ringed with black, grey and dark reddish-brown. It is said to occur in West Africa as well as in Rhodesia. Not represented in Coryndon Museum.

Nudaurelia cytherea (Fab.) PINE EMPEROR.

Plate 10.

This is another yellow species, also from Southern Africa; very variable in markings. The eyespot is usually larger on forewing than in *krucki*, and on hindwing the black ring is broader. The medial area is not shaded with grey or brown (unlike *carnegiei* and *macrops*). The lines are thicker, the inner one irregular, the outer slightly curved in near the forward edge (costa) of the forewing. It is vaguely and very doubtfully recorded from East Africa but is common in parts of Southern Africa. There are examples of the more typical variety of *cytherea* from Cape Province in Coryndon Museum.

In South Africa it is a well-known pest on pine trees; the caterpillar also feeds on *Acacia* and *Euclea*.

Nudarurelia richelmanni (Weym.) RICHELMANN'S EMPEROR.

Plate 10.

Smaller than *krucki*, which it somewhat resembles. Ground colour chrome yellow. Eyespot on forewing yellow, maroon, pinkish-white, dark crimson; on hindwing large, deep yellow, ringed with black, crimson, pinkish-white and dark crimson. On the underside the eyespots are ringed with deep yellow. Forewing about 2½ inches. No specimens in Coryndon Museum. In the British Museum there are examples from Entebbe (Uganda), and from Southern Tanganyika. In van Someren's collection, from Suna, South Kavirondo (Kenya). In the National Museum of S. Rhodesia, from Nyasaland.

Nudaurelia kasaiensis Bouv., may be a form or race of *richelmanni*. It is about the same size, but the ground colour is thickly speckled with black, and near the margin in both sexes the veins are darkened. No specimens in Coryndon Museum. Described from the Cunene region of Southern Angola, it occurs in the Southern Congo and Northern Rhodesia.

Nudaurelia anna (M. & W.) BEAUTIFUL EMPEROR.

Plate 11.

Ground colour of forewing and margin of hindwing chrome yellow; hindwing deep red from base to outer lines. Lines very thick, double, red and grey, the inner almost straight, the outer a little curved, followed by another line which is yellow and then, submarginally, by a grey and purplish band. Medial area of forewing often somewhat suffused with brown. Eyespot on forewing greyish with narrow black ring; on hindwing greyish, ringed with black and pink. Forewing $2\frac{1}{4}$ - $2\frac{3}{4}$ inches. A very distinct and strikingly beautiful species. In Coryndon Museum from Rabai, near Mombasa.

Nudaurelia wahlbergi (Bsd.) WAHLBERG'S EMPEROR.

Plate 11.

Ground colour yellow; forewing rather thickly speckled with brown. A pale pink patch at base of forewing (as in *dione*). Inner line very irregular, and smudged with pale pink. Eyespot on forewing developed but small; on hindwing yellow, narrowly ringed with black, then pink and red circles. Forewing 2- $2\frac{3}{4}$ inches. In Coryndon Museum a series from Amani (Tanganyika); and an example from Natal. It ranges from South Africa to Kenya.

Some authors incorporate *rhodina* as a form or race of this species, but here it will be treated later as a separate species.

Nudaurelia ungemachti Bouv., was described from a single female taken in Ethiopia (Abyssinia). It is said to be near *wahlbergi* but dark olive green in colour. Outer line narrow, pale grey and blackish, curved outwards behind the eyespot. Eyespot of forewing as in *wahlbergi*; on hindwing yellow, black, red, whitish-violet and blackish-brown. Size similar to the last species. I have not seen this insect.

(g) *gueinzii* group.

Nudaurelia gueinzii (Karsch) VARIABLE EMPEROR.

Plate 12, 25.

Ground colour very variable, yellow, orange, red or brown, in various shades. Inner line irregular, but also somewhat inconstant in shape, occasionally nearly straight; outer line straight. Apex of forewing not falcate, or merely slightly so in male. No eyespot on forewing, or merely a very small ring of colour round the glass spot; eyespot on hindwing yellow, ringed with black and pinkish-white. No pale markings in the submarginal zone. Several forms or races have been named but they are scarcely of importance here. The form *fasciata*, for instance, is dark, with a medial band showing as a darker shade: but this medial stripe may appear in any of the colour forms. In form *venus* the ground colour is bright yellow and the forewing is slightly falcate in the male. *Nudaurelia cleoris* (Jord.) (described in the genus *Imbrasia* originally) appears to be only a dark brown *gueinzii* from Kivu (Belgian Congo). The single original of *cleoris* is in the British Museum.

In Coryndon Museum *gueinzii* is from Nairobi and Nakuru (Kenya); Amani (Tanganyika). It also occurs in Rhodesia.

The caterpillar may be roughly described as being like that of *N. krucki*, but with reddish-brown bands at the junctions of the segments.

Nudaurelia anthina (Karsch) PALE-BANDED EMPEROR.

Plate 12

Very similar to *gueinzii* in colour and markings, but with a pale pinkish submarginal band, with a toothed edge to it; forewing of male more falcate, like *myrtea*. Ground colour, lines and

eyespot similar to *gueinzii*. Forewing $2\frac{1}{2}$ - $2\frac{3}{4}$ inches. It does not seem improbable that it might be only a form of the latter species, for the pale submarginal band may be indistinct sometimes, and the falcate apex is scarcely a stage further than that of *gueinzii* form *venus*.

In Coryndon Museum, *anthina* is from Toro (Uganda), Amani (Tanganyika) and Southern Rhodesia. It also occurs in West Africa.

Under *anthina* there is a form or race named *persephone* Stgr. of which I have seen no examples. It is dark reddish-brown and, superficially at least, appears to resemble *Imbrasia epimethea*. If it is near *anthina* I suspect that it will not have the short black hair scattered all over the underside of the wings (see *Imbr. epimethea*): at most there will only be a little black scaling in the outer bands on the underside.

NOTE ON FALCATE APICES OF WINGS

As far as the apical falcation is concerned in Emperor moths, this involves a problem that might, perhaps, be partially resolved by large scale breeding. There are species in some genera which appear to vary from an apex which is not falcate to one that is slightly so; or from a mildly falcate tip to one curved strongly outwards. As examples we can cite *Nudaurelia gueinzii* and its form *venus*, as well as *N. anthina*; or *Athletes semialba* and *A. gigas*. Are these (and other examples) distinct species or are they (more probably) forms only of single species; conditioned, perhaps, by environment or ecology? Again there is the insect to which we will refer later as *Lobobunaea saturnus*. In this the falcate apex of the male can evidently be either rounded or square-cut. From the series I have seen, I have little doubt they belong to the one species of *Lobobunaea*. Is this a physiological problem?

Nudaurelia myrtea Rbl. HOOKED EMPEROR.

Plate 12.

This is again very close to *gueinzii* and was originally described by Rebel as a variety of that species. Here I am treating it separately, but this might easily be incorrect. The apex is more strongly falcate even than in *anthina* and it is more pointed (i.e. less broadly rounded). The outer line is straighter and runs nearer to the apex than in either *gueinzii* or *anthina*. There are no pale submarginal markings. Otherwise like *gueinzii*. Forewing $2\frac{3}{4}$ -3 inches. In Coryndon Museum, from Amani (Tanganyika). The range probably extends to West Africa.

Nudaurelia rubra Bouv., described from the Congo, seems to be very near *anthina* and *myrtea*, having a pale submarginal band. The ground colour is said to be reddish. In Coryndon Museum, there is a male that may be this insect, from Amani (Tanganyika), but it is by no means certain. It has a uniform pinkish-red ground colour, and a falcate apex. Forewing about 3 inches.

Nudaurelia reducta Rbl. LITTLE EMPEROR.

Plate 12.

Like a small yellowish *gueinzii* and as Gaede suggested it is probably no more than a dwarf of that species. In Coryndon Museum there is a female I have tentatively put down to this insect: ground colour deep yellow, finely speckled with reddish-brown. Inner line (like *rhodina*) convexly and irregularly twisted into a double loop; outer line straight. Glass spot on forewing only ringed by a very small eyespot; on hindwing it is yellow, ringed with black, red, pink and red. Forewing $1\frac{1}{4}$ inches. Rebel's illustration of *reducta* shows the inner line less convex, more like *gueinzii*, in fact. He described it from Nyasaland; the Coryndon female is from Kampala (Uganda) but possibly only a dwarf aberration of *gueinzii*.

Nudaurelia rhodina Roths. BLACK-RINGED EMPEROR.

Plate 11.

Distinct from all the *gueinzii* group described above. Ground colour of forewing and outer part of hindwing yellow, orange or light brown. Inner line spreading convexly outwards in the form of two M-shaped loops. Eyespot on forewing scarcely developed; on hindwing with small

yellow centre, ringed very broadly with black and surrounded by white. Forewing $1\frac{1}{2}$ -2 inches only. In Coryndon Museum from Kinangop and other parts of the Aberdare Mountains in Kenya.

In the past this has been regarded as a race of *wahlbergi* but I believe it is a separate species.

Nudaurelia amathusia Weym., described from Cameroons, is also fairly readily distinguished. Ground colour pinkish-brown; forewing falcate, margin of hindwing slightly wavy. Lines doubled on forewing but the inner one is faintly defined; the double outer line filled in between with whitish. Eyespot on forewing small, yellow and red; on hindwing yellow, ringed with black and pink. Forewing $2\frac{1}{2}$ inches. It is not represented in Coryndon Museum, but Mr. Sevastopulo thinks he has taken it in Kampala (Uganda).

Nudaurelia emini (Butl.) DUSKY GOLDEN EMPEROR.

Plate 11.

Ground colour deep yellow; medial area frequently suffused with dark red. Lines thick, smudged towards medial area; inner line irregular, outer one straight. Eyespot on forewing very small, reduced to a small ring round the glass spot; on hindwing yellow in centre, ringed with black, red, broad pink and another thin red circle. Apex of forewing slightly falcate. Forewing $2\frac{1}{2}$ -3 inches. *Nudaurelia geschwandneri* Rbl., is evidently only the same species.

In Coryndon Museum from Kitale (Kenya). Also found in Central and West Africa.

N. macrops, given here as a separate species (on a previous page) but originally described as a race of *emini*, differs in the shape of the inner line and in the large eyespot on the forewing.

Nudaurelia nictitans (Fab.) BLACK-EYED EMPEROR.

Plate 11.

Pinkish-brown, often with slightly greenish shade. Lines very thin, brown; inner one angled, outer almost straight. No eyespot on forewing, only a tiny glass spot; on hindwing greyish-yellow or grey in centre, with a thick black ring, thinner outer circles of greyish-yellow and whitish. Forewing 2 - $2\frac{1}{2}$ inches. It is quite an easily recognized species. In Coryndon Museum, from South Kavirondo (Kenya). It is known in West Africa.

Lobobunaea Pack.

Although not such a large group as *Nudaurelia* it is also rather a difficult one, perhaps a little confused. Most of the species are large or very large. It is closely allied to *Bunaea*.

Key to *Lobobunaea* :—

1. Thorax without a white collar or merely a thin greyish one . . . 2
 Thorax with a distinct white collar; outer ring of eyespot on hindwing not yellowish . . . 4
2. Apex of forewing rounded and falcate . . . *acetes*
 Apex of forewing pointed . . . 3
3. Apex distinctly falcate; inner line of forewing straight and oblique; trace of pale grey collar on thorax . . . *jamesoni*
 Apex scarcely falcate; inner line very irregular; no collar . . . *goodii* and *rosea*
4. Outer line distinct, curved but not wavy; eyespot of hindwing large, ringed with red and pink circles . . . 5
 Outer line indistinct (or if distinct then it is wavy); eyespot of hindwing grey and black without coloured rings . . . 9
5. Underside with brown blotches in centre of each wing . . . 6
 Underside without brown blotches (merely a coloured spot on forewing) . . . *saturnus*
6. Underside of hindwing with a branch extending from the central blotches towards the base . . . *christyi*
 Underside of hindwing without a branch to base from central blotches . . . 7
7. Both surfaces of the wings uniform brown colour not speckled with black. Eyespot on forewing absent or small . . . 8
 Both surfaces grey, strongly speckled with black, eyespot on forewing large . . . *phaeax*

8. Forewing at least $3\frac{1}{2}$ inches long. Outer margin of hindwing only slightly curved in middle
 ... *phaedusa*
 Forewing less than 3 inches long. Outer margin of hindwing distinctly convex in middle
 ... *laurae*
9. Large species, forewing over 3 inches long ... *alinda*
 Smaller, forewing under 3 inches (rarely 3 inches) ... 10
10. Forewing with only the median line distinct above, and curved, not wavy ... *heyeri*
 Forewing with outer line usually developed on upperside; median line wavy ... 11
11. All lines well developed on both wings, wavy and edged with orange. Underside with large
 brown patches ... *tyrrhena*
 Lines less distinct, not so strongly waved and not edged with orange. Underside the brown
 blotches small or absent ... 12
12. Body and greater part of wings deep orange ... *natalensis*
 Body and wings yellow, grey or brown ... *epithyrena*

Lobobunaea acetes (Westw.)

Plate 15.

Yellowish to reddish-ochreous or pinkish. Lines dark, the inner strongly toothed, the outer almost straight and close to margin. Marginal area pale pinkish. Glass spot on forewing small in male, larger in female, and narrowly ringed with brown. Eyespot on hindwing greenish-brown in centre, ringed with black and dirty whitish-yellow. Forewing 3 inches long. No specimens in Coryndon Museum. Sevastopulo tells me he has taken it at Kampala (Uganda). A West African species.

Lobobunaea jamesoni (Druce) JAMESON'S EMPEROR.

Somewhat like a small, dark brown or very dark green *goodii*, but apex of forewing a little more falcate; inner line straight and oblique; eyespot on hindwing small, brown, ringed with black and whitish-yellow. Foreward margin (costa) of hindwing bright pink on both surfaces. Thorax with faint grey collar. Forewing $2\frac{1}{2}$ inches. In Coryndon Museum from Kampala (Uganda). Occurs in the Congo and West Africa.

Lobobunaea goodii (Holl.) CREAM-RINGED EMPEROR.

Plate 15.

Ground colour brown to reddish-brown; hindwing red towards upper (costal) margin. Inner line irregular, outer one gently curved; both lines normally white-edged outwardly. Apex of forewing very slightly falcate. No eyespot on forewing (on either surface); on hindwing it is grey, black and creamy-white. Hindwing below, without markings. Forewing $2\frac{1}{2}$ - $2\frac{3}{4}$ inches. No trace of white collar on thorax. In Coryndon Museum from Thika and Kinangop in Kenya; known also in West Africa.

L. rosea (Sonth), described from Tanganyika may be only a form of the same species. It is said to have a redder ground colour and is marked with a brown median line. We have seen above, in *Nudaurelia*, that this latter feature is variable, and it may also be an unreliable character. In Coryndon Museum, there is a female from Busia (Kenya-Uganda border) that might be *rosea*: it is deep reddish-orange, suffused with pink at the lines; glass spot on forewing larger than in normal female of *goodii*.

L. erythrotis (Karsch), from West Africa, is also very near *goodii*. Here again the glass spot on forewing of female is also large. Perhaps the Busia example belongs here rather than to *rosea*. It would be necessary to see more material to say whether these three are all distinct species or not.

Lobobunaea phaedusa (Drury) BLOTCHED EMPEROR.

Plate 16.

Ground colour ochreous-brown, reddish-brown or violet-brown. Inner line faintly discernible, irregular; outer line gently curved and *not* whitish on its outer edge. Forewing sharply falcate.

Eyespot on forewing absent in male, usually present in female; on hindwing it is broadly black in centre, ringed with red and pinkish-white, surrounded by a red suffusion. On underside the glass spots of both wings are encircled with yellowish-brown blotches; near base of hindwing there is another smaller patch. These splotches of the underside readily distinguish this species from *saturnus*. Forewing $3\frac{1}{2}$ inches. In Coryndon Museum from Kampala (Uganda,) and Kivu (Belgian Congo). A West African insect.

Lobobunaea laurae Strand. SMALL BLOTCHED EMPEROR.

Described from Spanish Guinea this is very like a small *phaedusa*. It appears to be one of the species collected by Sevastopulo at Kampala (Uganda). Forewing $2\frac{1}{2}$ inches.

Lobobunaea christyi (Sharpe) CHRISTY'S EMPEROR.

Plate 14.

Somewhat like a pale *phaedusa* but the apex very much more falcate in male. Ground colour light brown, with marginal area pale grey, speckled with black dots. Eyespots, above, similar in colour to *phaedusa* but well developed on all wings in both sexes. On underside there is an eyespot on forewing, black, red and whitish; on hindwing, like *phaedusa*, there are large central blotches, but the largest of these stretches a long arm away towards the base of the wing. Forewing $3\frac{1}{2}$ - $3\frac{3}{4}$ inches. In Coryndon Museum from South Africa and Rhodesia. It is also said to occur in East and West Africa, but I do not think East African records have been verified.

Lobobunaea phaeax Jord. SPECKLED EMPEROR.

Plate 14.

Close to *christyi* but with the ground colour uniform grey-brown (not paler at the margin), heavily speckled with black, outer line usually curves a little more inwards below the eyespot, to meet the lower margin of the forewing a little nearer the base than in *christyi*. Forewing also strongly falcate in male, angled in female. Underside with blotches formed as in *phaedusa*. Antennae slightly less broadly feathered than in *christyi*. Forewing $3\frac{1}{2}$ inches. In Coryndon Museum, from Kitale (Kenya) and Nigeria. The species was originally described from the Gold Coast.

Lobobunaea saturnus (Fab.) SATURN EMPEROR.

Plate 13, 14.

Under this name I am here incorporating *L. ammon* (Karsch) and *L. tanganicae* (Sonth), (a peculiar rendering of Tanganyika). To me it seems they are all forms of one very variable species, and of these *saturnus* has priority as the earliest name.

The apex of the forewing is falcate, in male either rounded or square-cut along the edge of the falcation; in the female blunt or sharply falcate. Ground colour in *saturnus* ochreous-brown or grey-brown; in *tanganicae* similar; in *ammon* yellowish to orange or reddish. Inner line faint or almost absent, irregular in shape; outer line edged with white and gently curved. In *saturnus* there is a darkish, diffuse medial band, absent in *tanganicae*: but as pointed out earlier this sort of band, which is not a definite line, is inconstant and cannot be taken as an important feature. Sometimes this medial band shows in *ammon*. No eyespot on forewing above; on hindwing it is large, black in the middle, ringed with red and pinkish, and surrounded by a red suffusion in *ammon* or a dark purple zone in *saturnus* and *tanganicae*. Intermediate tendencies occur: for instance a greyish example of form *saturnus* may have traces of reddish on the wings, tending towards form *ammon*. On the underside the forewing has a small eyespot which may be bisected into hemispheres: black, edged with red and pinkish-white. The hindwing has no eyespot or blotches at all. Forewing $3\frac{1}{2}$ - $3\frac{3}{4}$ inches. In Coryndon Museum, there is a variable series from Nairobi, Endebess and Kitale (Kenya); Amani and Ukerewe Island (Tanganyika). Also occurs in West Africa.

Caterpillar green: smooth skinned but the segments somewhat bulbous. Feeds on *Acocanthera*.

Lobobunaea angasana (Westw.), of southern and central Africa is very similar to *saturnus* form *ammon*; with inner and outer lines slightly darker, not so clearly edged with a pale line. Ground colour yellowish, pinkish-orange or light grey. Other markings, above and below, very like *ammon*. In all probability it represents a southerly form of *saturnus*. Forewing about $3\frac{1}{4}$ - $3\frac{1}{2}$ inches. In Coryndon Museum from Bulawayo, Southern Rhodesia.

I think the caterpillar feeds on *Upaca* and, perhaps, *Eugenia*.

Lobobunaea tyrrhena (Westw.) V-MARKED EMPEROR.

Plate 15.

Apex of forewing in this and the following species of *Lobobunaea* pointed and falcate. Ground colour of forewing and margin of hindwing reddish or orange-brown, base of hindwing pale or bright orange. Lines orange-edged; inner line very irregular, medial and outer lines very wavy. No eyespot on forewing; on hindwing grey and broadly black. Underside with brown spots or blotches in centre, a small one at base of hindwing and another at apex of forewing. Ground colour of underside pale, thickly speckled with grey; thin, wavy, brown medial and outer lines. Forewing $1\frac{3}{4}$ - $3\frac{1}{4}$ inches, very variable in size. In Coryndon Museum, from Kitale and Kakamega (Kenya); Amani (Tanganyika); also occurs in South and West Africa.

Lobobunaea natalensis (Aur.) NATAL EMPEROR.

Plate 15.

Ground colour generally deep orange or reddish-orange on forewing; hindwing bright orange. A paler variety has a yellowish-brown forewing and yellow hindwing. Sometimes this paler form may have, at least in the female, a tinge of greenish on the forewing. On this wing all three lines, inner, medial and outer, are grey and wavy, generally distinct. Eyespot similar to *tyrrhena*. Apex also as in that species but hindmargin generally slightly straighter. Underside of hindwing normally with a dark triangular patch in middle and another at apex (although these may be unstable features in this section of *Lobobunaea*: the patches may be present or absent). Medial and outer lines distinct, dark brown and wavy. In the female the underside may have larger dark patches. Forewing $2\frac{1}{2}$ - $3\frac{1}{4}$ inches.

This insect is very closely allied to the next one, *epithyrena*, and without detailed study of long series I would not be certain that they are not colour variations of the same species. It is certainly difficult to pick out stable characters other than differences in colour.

In Coryndon Museum from Nairobi and Mombasa (Kenya); Amani and Arusha (Tanganyika). Also found in South and Central Africa.

I believe the caterpillar is green with silvery and black dots, and armed with very short black spines.

Lobobunaea epithyrena (M. & W.) ORANGE AND BROWN EMPEROR.

Plate 15.

Ground colour of forewing and margins of hindwing grey-brown to light purplish-brown; rest of hindwing orange. Margin of forewing usually slightly curved, bordered with pale violetish-grey. Other features as in *natalensis*. Underside also similar and variable, usually without the dark apical spot on forewing. Forewing $2\frac{3}{4}$ -3 inches. In Coryndon Museum from Nairobi and Kakamega (Kenya); Arusha and Amani (Tanganyika); and Rhodesia. Also occurs in West Africa.

Lobobunaea heyeri (Weym.) ORANGE EMPEROR.

Said to be a reddish-yellow species; only the medial line distinct on forewing, somewhat curved but not wavy. Hindwing orange-red without lines. The species is recorded as East African. In Coryndon Museum, there is a male which may be this insect, from Ukerewe Island (Tanganyika). On the other hand the Museum has an example of *L. natalensis* which also approaches it. Perhaps *heyeri* is only a form of *natalensis* with reduced markings?

Lobobunaea cyrene Weym., said to be related to *heyeri*, with forewing reddish-grey; hindwing with larger eyespot and much broader ($2\frac{1}{2}$ inches) reddish-grey marginal band. Underside with brown spots in middle of forewing but none on hindwing. No specimens in Coryndon Museum, although it is stated to be East African. Perhaps it is an aberration of one of the previous species?

Lobobunaea alinda (Drury) LARGE ORANGE EMPEROR.

Like a very large *L. natalensis*: perhaps a western race of that species? Forewing and margin of hindwing reddish-or purplish-brown. Lines on forewing of male grey-brown, in female absent. Hindwing mainly orange; eyespot as in all the last species. Underside with wavy medial and outer lines, a dark apical spot on forewing. Forewing $3\frac{1}{4}$ inches. In Coryndon Museum one female from Ukerewe Island (Tanganyika) is probably this species. It occurs in West Africa.

Lobobunaea morlandi Roths. MORLAND'S EMPEROR.

As large as, and only slightly differing from, *alinda*: underside of forewing with outer line nearer margin than in the latter; medial line foreshortened, only reaching the glass spot (this marking, I imagine, cannot be accepted as a reliable feature). Described from Pemba Island, near Zanzibar, but no examples in Coryndon Museum.

Cinabra Sonth.

Medium or smallish moths, reddish; wings rounded.

Key to *Cinabra* :—

1. Hindwing with well-defined outer line; submarginal band grey...*hyperbius*.
Hindwing without distinct outer line, submarginal band pink...*pygmaea*.

Cinabra hyperbius (Westw.) TREBLE-BANDED EMPEROR.

Plate 16.

Body and forewing reddish; hindwing light reddish-orange. Lines on forewing grey; hindwing with two grey bands near margin separated from another band by yellow. No eyespot on forewing; on hindwing it is broadly grey, ringed with black. A variety (or perhaps a race) commoner in Southern Africa is *bracteata* Dist. (described as a separate species): it has the hindwing yellow instead of reddish-orange. Forewing 2-2 $\frac{1}{4}$ inches. In Coryndon Museum, from Kakamega (Kenya); and Rhodesia. Distributed from South to East Africa.

The Caterpillar, in Southern Africa, feeds on *Brachystegia* and *Protea*.

Cinabra pygmaea (M & W.) PIGMY EMPEROR.

Plate 16.

Smaller than *hyperbius*. Forewing with lines indistinct, hindwing orange with pink marginal band. Otherwise, as in the previous species. In form *pygela* Druce the lines on forewing are missing altogether. Forewing 1 $\frac{1}{2}$ -1 $\frac{3}{8}$ inches. In Coryndon Museum only from Rhodesia. It occurs in East Africa.

Melanocera Sonth.

Unlike *Cinabra*, the margins of the wings are wavy.

Key to *Melanocera* :—

1. Thorax with white collar; outer line on forewing straight...*menippe*
Thorax without white collar, outer line on forewing curved...*sufferti*

Melanocera sufferti (Weym.) SUFFERT'S EMPEROR.

Plate 7

Wing margins wavy, especially in female. Ground colour red with narrow white outer line. Eyespots well developed on all wings, grey in centre, ringed broadly with black and surrounded by a white circle. Forewing $1\frac{3}{4}$ - $2\frac{1}{4}$ inches. In Coryndon Museum from Mackinnon Road, Mombasa and Mtito Andei (Kenya). Also known in West Africa.

Melanocera menippe (Westw.) CHESTNUT EMPEROR.

Plate 16.

Colour more brick red than in *sufferti*; inner lines white but thicker. Thorax dark red, abdomen yellowish. Antennae thicker than in *sufferti*. Wings with broad yellowish marginal band, sprinkled with black dots. Forewing $2\frac{1}{2}$ inches. In Coryndon Museum, from South Africa. known in Rhodesia but apparently not in East Africa.

Cirina forda (Westw.) PALLID EMPEROR.

Plate 13, 14, 26.

A small, drab species; uniform light grey, pink or orange; the lines grey. No eyespot on forewing and only a very small black one on hindwing. Forewing $1\frac{3}{4}$ - $2\frac{1}{2}$ inches. In Coryndon Museum, from Nairobi and Mombasa (Kenya); Ituri Forest (Belgian Congo); and Rhodesia. It is common in most parts of South, East, Central and West Africa.

Caterpillar black, with narrow yellow bands, and some sparse white hair. Feeds on *Carissa* and *Warburgia*.

Urota sinope (Westw.) TAILED EMPEROR.

Plate 17.

Wings not falcate. Ground colour of forewing and margin of hindwing orange, red or brown; rest of hindwing red. Forewing with two white lines, fairly straight; a white central dot. Forewing $1\frac{1}{2}$ -2 inches. In Coryndon Museum, a long series from Isiolo, Mandera and Kitale (Kenya); Kampala (Uganda); and Rhodesia. Also found in South Africa.

Gynanisa maia (Klug.) SPECKLED EMPEROR.

Plate 17.

A large and variable species. Antennae thickly feathered in male. Margins of wings wavy, the hindwing generally slightly angled in middle of its margin, but not so in female. Ground colour brown, more or less speckled or suffused with white: the variability in the intensity of this white sprinkling ranging from dark brown specimens with little white marking to very pale examples liberally speckled with it. Dr. van Someren says he has reared such variations from single broods.

Base of hindwing red. Lines on forewing, inner, medial and outer, are thin and dark brown: the inner line white-edged and irregular, the outer also white-edged and slightly wavy. There is also some banding in the outer portions of the wings. Forewing either with no eyespot or merely a tiny circlet around the glass spot. Eyespot on hindwing black in the middle, with a thin yellow ring, thin black one, another yellow one and a pink outer circle. Forewing $2\frac{1}{4}$ -3 inches. In Coryndon Museum, from Nairobi, Machakos, Isiolo, Kakamega, Voi, Meru, Kitale and Mtito Andei (Kenya). It is common and widespread in Africa. Caterpillar feeds on *Acacia*.

Athletes Karsch.

Very large brown moths, sprinkled with white; the male short-tailed on hindwing.

Key to *Athletes* :—

- | | |
|--|----------------------|
| 1. Basal part of forewing not frosted with white... | <i>ethra</i> |
| Base and front edge of forewing suffused with white... | 2 |
| 2. Apex forewing strongly falcate; eyespot hindwing with a broad yellowish ring... | <i>semialba</i> |
| Apex less falcate; eyespot with broad red ring... | <i>steindachneri</i> |

Athletes semialba Sonth. FROSTED EMPEROR.

Forewing apex strongly falcate; margin wavy; hindwing with prominent tail in male. Ground colour rich brown, strongly suffused in basal half with white (more extensively, it is said, than in *steindachneri*, but this is probably a variable feature). Eyespot on hindwing black in middle, surrounded by yellow, thin black, broad yellowish and pink rings. Forewing $3\frac{1}{4}$ - $3\frac{1}{2}$ inches. Despite the stronger falcation in this species it would appear a little uncertain that it is truly distinct from the next species. In fact, in Coryndon Museum, specimens with strongly falcate apex have the eyespot coloration of *steindachneri*. The white zone may be variable in extent. Could the apical falcation be climatic or seasonal in development (like some *Precis* butterflies)? In Coryndon Museum, this insect with strong falcation is also from Rhodesia. It is recorded from East Africa.

Caterpillar pale green with bluish and violet suffusion, and adorned with gold spines. Truly, a beautiful creature, like the adult. It feeds on *Cassia* and *Brachystegia*.

Athletes steindachneri Rbl. STEINDACHNER'S EMPEROR.

Plate 1, 18.

Very like *semialba*, but the apex less strongly falcate; eyespot on hindwing black, yellow, black, broadly red and pink. Other remarks as under the previous insect. Forewing $3\frac{1}{4}$ - $3\frac{1}{2}$ inches. A form named *gigas* Smith is said to be intermediate to *semialba*, and although I cannot place examples to *gigas* with certainty the fact of its existence supports the belief that this and the last insect belong to the same species.

In Coryndon Museum from Amani and Lushoto (Usambara Mts, Tanganyika) and Rhodesia.

Athletes ethra (Westw.) DUSKY FROSTED EMPEROR.

Plate 18.

Duller than the previous species, without the white basal powdering on forewing. Hindwing more strongly tailed. Eyespot on hindwing black, thin yellow, thin black, yellowish rings. Forewing $3\frac{1}{2}$ inches. No specimens in Coryndon Museum. Dr. van Someren has an example from Kitale (Kenya). Recorded from Central Africa.

Pseudanthraea arnobia (Westw.) BUFF EMPEROR.

Plate 18.

Wings slightly falcate, at least in male. Ground colour yellow, speckled more or less strongly with pale reddish-brown. Forewing with inner line faint, brown, oblique or zigzag; outer line straight but directed obliquely to apex; hindwing with straight medial line before the glass spot, outer line wavy, and beyond this a row of dots. No eyespot on forewing; on hindwing only a small, brown-edged glass spot. Forewing $2\frac{3}{4}$ inches. In Coryndon Museum, from Kivu (Belgian Congo); and Nigeria. Almost certainly occurs in Uganda.

Tagoropsis Feld.

Small, yellow or reddish-brown moths.

Key to *Tagoropsis* :—

- | | |
|---|------------------|
| 1. Apex rather narrowed, and distinctly falcate in male . . . | <i>songeana</i> |
| Apex broadly rounded . . . | 2 |
| 2. Mainly yellow; outer line fairly straight but wavy . . . | <i>flavinata</i> |
| Mainly reddish-brown; outer line curved round at upper end to go nearer to apex . . . | <i>sabulosa</i> |

Tagoropsis flavinata (Wk.) GOLDEN MARBLED EMPEROR.

Plate 19.

Apex broadly rounded. Ground colour yellow. Lines reddish brown, often more strongly marked in female than in male. Inner line zigzag, median slightly wavy, outer line distinctly

waved; beyond these some reddish submarginal spots; especially in female. Eyespots very minute; on forewing brown-ringed, on hindwing usually just a minute glass spot. Forewing $1\frac{1}{4}$ - $1\frac{3}{4}$ inches. In Coryndon Museum, from Kitale. Common from South to East Africa.

Tagoropsis sabulosa Roths. RUFOUS MARBLED EMPEROR.

Plate 19.

Similar to *flavinata* but so thickly speckled and marked with reddish brown as to appear brown in colour. Median line more strongly waved, outer line curving slightly nearer apex. Forewing $1\frac{1}{4}$ - $1\frac{3}{4}$ inches. In Coryndon Museum, from Amani (Tanganyika).

Tagoropsis hamingtoni Butl., appears to be plainer than *flavinata* and *songeana*, without submarginal spots and the forewing not falcate. No specimens in Coryndon Museum seem to agree with this. It is recorded from Central Africa. It may be a distinct species or, perhaps, a weakly marked *flavinata*.

Tagoropsis songeana Strand. SULPHUR EMPEROR.

Plate 19.

Plainer yellow than *flavinata*, with or without small submarginal spots; outer line almost straight and not wavy. Wings somewhat falcate in male. Forewing $1\frac{3}{4}$ -2 inches. In Coryndon Museum, from Amani, Moshi and Ukerewe Island (Tanganyika); Kakamega (Kenya); Kalinzu Forest and Fort Portal (Uganda). It almost certainly occurs in Central Africa.

T. lupina Roths., said to be more reddish in colour, may be the same species.

Pselaphelia Aur.

Characterized by their leaf-like form.

Key to *Pselaphelia* :—

1. Forewing with thick brown stripe running outwards from base to outer line. . . *flavivitta*
and *gemmifera*
Forewing without this thick stripe . . . *dentifera*

Pselaphelia flavivitta (Walk.) MARBLED LEAF EMPEROR.

and form or subspecies *gemmifera* (Butl.)

Plate 19.

Ground colour yellow, orange or pale brownish, speckled with grey or brown. In linking *flavivitta* and *gemmifera* together I am tentatively assuming the yellowish examples to be the South and East Coast race, the dark or grey ones the tropical and western race, of the same species. The Coryndon series is, however, so inadequate, that this assumption may be quite erroneous.

The forewing has three wavy lines and a straight, oblique outer line running to the pointed apex; additional to these there is a thick brown streak from base across middle of wing to centre of the outer lines. Eyespot very small. Forewing $1\frac{1}{2}$ - $1\frac{3}{4}$ inches. In Coryndon Museum, from Amani (Tanganyika); Nairobi and Kericho (Kenya); Bwamba Forest and Kigezi (Western Uganda). The distribution covers South, East and West Africa.

Pselapheliaentifera (M. & W.)

This mainly differs from the previous insect in lacking the thick brown radial streak. The only specimen which might belong here in the Coryndon Museum collection is a badly damaged female, brownish in colour, from Amani (Tanganyika).

It is not possible from the Museum's insignificant selection of *Pselaphelia* to surmise whether *dentifera* is merely a form of *flavivitta*, but I feel it is not altogether unlikely.

Usta Wallgr.

White moths with grey or brown markings.

Key to *Usta* :—

1. Medial area largely brown, speckled here and there with black . . . *terpsichore*
Medial area speckled all over with black or black and red dots . . . 2
2. Outer line wavy but uniform, and entirely parallel to margin . . . *wallengreni*
Outer line very irregular, partly zigzag and sharply toothed or angled below eyespot on forewing . . . *angulata*

Usta angulata Roths. ANGLED EMPEROR.

Plate 19.

Larger than the next species. Ground colour white, densely speckled with grey or grey-black, and with brown and reddish. Inner line irregular, with a double curve; outer one irregular, sharply toothed below eyespot on forewing. Eyespots developed on all wings. Forewing $1\frac{1}{2}$ -2 inches. In Coryndon Museum a long series from Isiolo, Voi, Mtito Andei, Kilifi and Moyale, in Kenya.

Usta wallengreni (Feld.) WALLENGREN'S EMPEROR.

Plate 19.

Smaller than *angulata*; inner line less irregular; outer line wavy and curved, but uniform and parallel to margin. Otherwise like the previous species. Forewing $1\frac{1}{2}$ - $1\frac{3}{4}$ inches. In Coryndon Museum, from Mandera in the Northern Frontier Province of Kenya. It ranges from South to East Africa.

Usta terpsichore (M. & W.) CAVORTING EMPEROR.

Plate 19.

Originally placed in *Heniocha*, this insect is closely similar to *angulata*. Male smaller, but female generally large. Markings browner. Inner line like *wallengreni*; outer more like *angulata*, but not so strongly toothed under eyespot on forewing. The white edges to the lines less distinct than in the previous insects. Forewing $1\frac{1}{4}$ - $1\frac{3}{4}$ inches. In Coryndon Museum, from Mandera, Mtito Andei, Emali Range, Mombasa and Isiolo (Kenya); Amani (Tanganyika); Mega (Abyssinia); Southern Rhodesia; South Africa. This also represents the range of this species.

Caterpillar feeds on *Commiphora* and *Sclerocarya*.

Pseudaphelia Kirby.

Mostly day-flying Emperor Moths, unlike other African genera. They have a slow flight, as their wings are broad and reminiscent of the Apollo butterflies of Europe.

It would seem that if the Coryndon Museum example of *P. roseibrunnea* is correctly identified then this species should be transferred to the next genus *Parusta*. In exchange, *Parusta xanthops* might be more satisfactorily placed in *Pseudaphelia*.

Key to *Pseudaphelia* :—

1. Antennae pale brown. No marginal yellow spots on wings . . . *roseibrunnea*
Antennae black. Wing margins usually marked with some yellow . . . 2
2. Margin continuously yellow, not spotted; no outer line . . . *flavomarginata*
Margin normally with yellow spots; Wings with outer line . . . 3
3. Forewing without central yellow spots; apex dark; marginal yellow spots free . . . *ansorgei*
Forewing with one or two central yellow spots; apex less dark; marginal spots encircled with dark grey . . . *apollinaris*

Pseudaphelia apollinaris (Bsd.) APOLLO MOTH.

Plate 20, 27.

Ground colour whitish or yellow, but thinly scaled. Margin generally with yellow spots but these are occasionally absent. Apex very rounded. Eyespots filled with yellow. Outer line grey

and wavy; but it is occasionally absent. Forewing $1\frac{1}{4}$ - $1\frac{1}{2}$ inches. Dr. van Someren has reared from single broods mixed offspring varying from yellow to white, and from well marked to almost unmarked. The moths fly by day. In Coryndon Museum, from Fort Portal (Uganda); Mombasa (Kenya); Amani, Arusha and Morogoro (Tanganyika); and South Africa.

The caterpillar is very peculiar. It is smooth, white, with thin black longitudinal lines; an orange line at the side; a black horn or "tail" at the rear end, rather like that found in the butterfly, *Melanitis leda*. or somewhat like the horn of a Hawk moth caterpillar. Feeds, probably, on *Com-bretum* and *Turraea*.

Pseudaphelia ansorgei Roths. ANSORGE'S APOLLO

Forewing without yellow spots, only a brown central spot; apex rather dark. Marginal spots small, yellow, and not encircled with grey or brown. Outer line of hindwing nearer to end of cell than to margin. Recorded from East Africa but no examples available. It does not seem improbable that it is an extreme variety of *apollinaris*.

Pseudaphelia flavomarginata Gaede. YELLOW-BORDERED APOLLO.

Ground colour white; margin and fringe yellowish, not spotted. Eyespots pale yellow. No outer line. An East African insect but I have not seen examples, perhaps it is also an extreme form of *apollinaris*?

Pseudaphelia roseibrunnea Gaede. BROWN-EDGED APOLLO.

A small, narrow-winged, white or creamy species. Margins, veins and outer line reddish-brown. No marginal yellow markings. Forewing about 1 inch long. Described from East Africa, examples in Coryndon Museum that seem to belong here are from Shinyanga (Tanganyika). They are very like pale specimens of *Parusta thelxinoe* and I suspect they really belong to *Parusta*, not to *Pseudaphelia*. The antennae of the male are brown instead of black, and more robust than in *Pseudaphelia*. The wings are narrower and the abdomen is banded, not dotted as in *apollinaris* and its relatives.

Parusta Roths.

Closely allied to the last genus.

Key to *Parusta* :—

1. Wings very broad, shaped like *Ps. apollinaris*, with the wings mainly whitish . . . *xanthops*
Wings narrow, not marked like *apollinaris* and the main colouring brown . . . *thelxinoe*

Parusta thelxinoe Fawc. DARK APOLLO.

Plate 19.

Wings narrow, the apex angled; mainly brown in colour, with white suffusion at base, along the lines and at apex. Outer line wavy. Eyespots yellow. Forewing $1-1\frac{1}{4}$ inches. In Coryndon Museum, from Voi, Mtito Andei, Isiolo and Mandera (Kenya). There is also a male aberration from Mandera with broad pinkish-ochreous marginal band on both wings.

Parusta xanthops Roths. SMOKY APOLLO.

Very like *Pseudaphelia apollinaris*. Forewing smoky white; brown inner and medial lines, the latter bent outwards. Forewing without marginal spots, hindwing with yellow ones. Eyespot yellow, ringed with brown. Forewing about $1\frac{1}{2}$ inches. Recorded from East Africa but I have not seen this species. It would seem possible that it is really a *Pseudaphelia*, not a *Parusta*.

Hemiocha marnois Rog. MARBLED EMPEROR.

Plate 19.

A variable species, with white ground colour marked with greyish or pale brown. A red patch near apex of forewing and the outer line red and broken into spots in its upper portion near this apex. Eyespot well developed on forewing, small or absent on hindwing. Forewing $1\frac{1}{2}$ -2 inches. In Coryndon Museum, from Machakos, Mtito Andei and Kilimafeza (Kenya); Ukerewe Island (Tanganyika). It is also distributed down to South Africa.

Heniocha apollonia (Cr.), is rather similar to one of the paler forms of *marnois* and is of about the same size. The outer line is continuous and edged with red near apex. It is so far recorded from Southern Africa only.

Leucopteryx Pack.

Easily recognized genus.

Key to *Leucopteryx* :—

1. Forewing brown with two distinct white lines . . . *ansorgei*
- Forewing brown at base, separated by a broad diffuse white band from a brown outer zone . . . *mollis*

Leucopteryx ansorgei (Roths.) WHITE-BARRED EMPEROR.

Plate 19.

Forewing grey-brown with two straight white lines, the outer one edged with red near apex. Hindwing white at base, brown in outer part, with white and yellow outer line. Eyespot on forewing small, on hindwing with a small black ring. Forewing $1\frac{1}{2}$ -1 $\frac{3}{4}$ inches. In Coryndon Museum, from Nairobi and Kitale (Kenya); Shinyanga (Tanganyika).

Leucopteryx mollis (Butl.) WHITE CLOUDED EMPEROR.

Plate 19.

Forewing brown at base, white in middle, suffused with brown in outer part; hindwing white, with diffuse brown margin. Eyespot on forewing red-ringed, on hindwing very small, black. Forewing $1\frac{1}{2}$ inches. In Coryndon Museum, from near the Tana River.

Eochroa trimeni Feld., a lovely pink moth, with large eyespots, is confined to South-West Africa.

Decachorda Aur.

Small moths with very rounded wings; no eyespots, only tiny glass spots. They might be confused with moths of a very different family, *Chrysopolomidae*, and to the uninitiated they scarcely look like Emperor Moths. Moreover, the separation of the few species is a vexed one. I suspect there is more variation within a species than was thought by the authorities who described them. For instance, *D. aurivillii* is surely the same as *D. rosea*. The males of this genus have very broadly feathered antennae.

Tentative Key to *Decachorda* :—

1. Ground colour decidedly pink... *bouvieri*, *rosea*, *aurivillii*
- Ground colour not mainly pink... 2
2. Lines on forewing indistinct; pinkish-ochreous, very thickly speckled with black... *bouvieri*
- Outer line in forewing distinct; more sparsely speckled... *kitalina*
3. Yellow or orange, with purplish outer line and speckles... 3
- Yellow to reddish, with blackish outer line and speckles... *fulvia*
- aspersa*

Decachorda aspersa Bouv. DUSKY SPECKLED ROUNDWING:

Plate 20.

Wings reddish with straight blackish outer line, and speckled with black; or, in form *orientalis* Bouv., yellow, with similar black markings. Forewing $\frac{3}{4}$ -1 inch long. I am not sure whether

intermediates between this and *fulvia* exist: if they do, then *fulvia* will be the specific name, with *aspersa* as a form of it. In Coryndon Museum from Nairobi, Machakos, Sultan Hamud and MacKinnon Road (Kenya); Ukerewe Island (Tanganyika). Also known from West Africa.

Decachorda fulvia (Druce) VIOLET SPECKLED ROUNDWING

Plate 20.

Very similar to the last; yellow to orange, less heavily speckled, with purplish (instead of black) outer line. In the male the head and forward wing margin (costa) are purplish-brown. Forewing 1-1½ inches. In Coryndon Museum from Amani (Tanganyika) and Malindi (Kenya). Distributed to South Africa. Is *aspersa* a form or race of this species?

Decachorda rosea Aur. ROSY ROUNDWING.

Plate 20.

A small species, the male bright pink in colour, outer line slightly darker pink, often yellow edged, or the yellow suffused across the middle of the wing; the outer line straight or curved. Forewing $\frac{3}{4}$ - $\frac{7}{8}$ inch. The female is a little darker than the male, speckled with black, almost like *aspersa* but redder and with sparser black dots. Examples from Southern and Northern Rhodesia of *rosea* show the same range of variation as those of *aurivillii* from Kitale, Kenya, so that they seem indistinguishable: examples from both areas are in Coryndon Museum. *D. rosea* is also found in South Africa.

Decachorda bouvieri kitalina Bouv. BOUVIER'S ROUNDWING.

Plate 20.

A very small Emperor Moth with pale pinkish-ochreous wings, very thickly speckled with black. Lines obscure on forewing; a speckled, brown border on hindwing. Forewing $\frac{3}{4}$ inch. In Coryndon Museum from Kitale (Kenya). And also in this Museum there is a small pinkish species of similar dimensions, the outer margin more highly convex than in *rosea*; sometimes speckled with dark brown, and with a brown outer line. I take this to be *D. bouvieri*. It is from Shinyanga (Tanganyika).

Micragone Westw.

Forewing falcate in male, no eyespots.

Key to *Micragone*:—

1. Small species, forewing scarcely over 1 inch, ground colour generally yellowish...*cana*
Larger, the forewing 1½ inches or more; ground colour usually deep brownish...*ansorgei*

Micragone cana Aur. PALE PRINCE.

Plate 20.

Male with very falcate forewing, violet-brown to pale yellowish-brown in colour, greyer at margin. Lines thin, brown, the outer one curved outwards towards the apex. Hindwing yellowish-brown to grey-brown, with a blue-grey spot at the lower angle. In the female the wings are not falcate; the ground colour paler, yellowish to grey-brown. Inner line indistinct on forewing. Forewing $\frac{3}{4}$ - 1½ inches. No specimens in Coryndon Museum, but it occurs in the Kitale District of Kenya, as well as in Central Africa.

Micragone ansorgei Roths. ANSORGE'S PRINCE.

Plate 20.

Under this name I incorporate *trefurthi* Strand and *bilineata* Roths. Forewing in male falcate, brown or reddish-brown, paler near the margin; lines blackish; hindwing paler, with reddish suffusion on upper (costal) margin. Female without the falcation; forewing dark, almost black, with a yellowish spot near the middle. Form *trefurthi* seems to be very like *bilineata* but larger.

Forewing $1\frac{1}{2}$ - $1\frac{3}{4}$ inches long. In Coryndon Museum, from Amani, Dodoma and Ukerewe Island (Tanganyika); Rhodesia. Also known from West Africa.

Caterpillar (of *bilineata*) black, yellow and red, with long pale hairs. Feeds on *Brachystegia*.

Subfamily *Ludiinae*. (a) Tribe *Ludiini*

Small reddish or brownish moths, characteristic in shape and markings, belonging to three genera, *Ludia*, *Pseudoludia* and *Holocerina*. The forewing in these has a peculiar angulated glass spot. The antennae are feathered for only part of their length, and the extent of this feathering helps to separate these genera.

Ludia: antennae in both sexes combed for two-thirds of their length (but in *arguta* for nearly three-quarters). Wing margins smooth or irregular, the apex generally falcate, especially in male. Hindwing red along front edge (costa). Ground colour grey-brown, reddish or greenish-brown. Eyespot on hindwing yellow, with a black crescentic mark.

Pseudoludia: Male antenna more feathery, combed for four-fifths of its length; female antenna only short-combed. Wing-margins smooth, apex falcate, especially in male. Ground colour pale reddish-brown. Eyespot as in *Ludia*.

Holocerina: Antenna of male only combed to half-way along shaft; in female the antenna is plain. Margin of wing regular or irregular; apex strongly falcate in male. Ground colour reddish or purplish-brown; costa of hindwing not distinctly reddened. Hindwing without a yellow eyespot; the glass spot present or absent on this wing.

Ludia Wallgr.

Key to *Ludia*:-

1. Margins of both wings uniform, scarcely toothed at all; medial area not distinctly delineated... *hansali*
- Margins irregular, toothed; medial area distinct... 2
2. Medial and outer lines on forewing wavy. Margins evenly toothed... *arguta*
- Medial line angled or toothed, outer line rather evenly curved... 3
3. Hindwing slightly angled or produced near middle; median line forewing distinctly toothed. In yellow eyespot of hindwing there is a white dot... 4
- Hindwing not angled; median line less distinctly toothed... 5
4. Forewing outer line almost straight in upper half; glass spot complete... *goniata*
- Forewing outer line curved inwardly near upper margin (costa); glass spot usually broken into separate pieces... *orinoptena*
5. Forewing outer line defined by white; eyespot of hindwing without a white dot— *dentata*
- Forewing outer line not sharply defined by white; eyespot of hindwing with a white dot in the yellow circle... *delegorguei*

Ludia arguta Jord. SMALL PRINCE.

Plate 21.

Male reddish-brown, female generally greyish; a small species. It is recognizable by the very wavy outer line of the forewing. Kenya specimens are considered to belong to subspecies *rusa* Jord., but they are somewhat variable. Forewing $\frac{3}{4}$ - $1\frac{1}{4}$ inches. In Coryndon Museum from Isiolo, Mtito Andei, Voi, Makindu and Mombasa (Kenya); Korogwe (Tanganyika).

Ludia hansali Feld. HANSAL'S PRINCE.

Plate 21.

Forewing dark grey-brown; margin almost straight, even in male; or only very faintly toothed. Forewing 1 - $1\frac{1}{4}$ inches. In Coryndon Museum from Nairobi and Kitale (Kenya); Kalinzu Forest (Uganda). It occurs in West Africa.

Ludia goniata Roths. BLACK PRINCE.

Plate 21.

Rather dark brown. Forewing strongly falcate (unlike the previous two); margin strongly toothed. Outer line forewing almost straight; glass spot intact, not broken up. Forewing 1-1½ inches. In Coryndon Museum from Amani (Tanganyika); Rhodesia. Also found in South Africa.

Ludia orinoptena Karsch REDDISH PRINCE.

Plate 21.

Male deep reddish-brown, female paler. Forewing in male strongly falcate, with fewer teeth on the margin than in *goniata*. Outer line incurved in its upper portion (near costa). Glass spot on forewing usually broken up. Forewing 1¼ - 1½ inches. In Coryndon Museum from Kitale and the Aberdare Mountains. It occurs in West Africa.

Ludia delegorguei (Bsd.) DELEGORGUE'S PRINCE.

Plate 21.

Dark reddish-brown to greyish-brown. Lines faintly white-edged. Margin toothed in male, less so in female. Forewing 1 - 1¼ inches. In Coryndon Museum from Kitale and Nyeri (Kenya); Rhodesia. Also known in South Africa.

Caterpillar yellowish-green with black dots and long white hair. Feeds on *Senecio* and *Microroglossa*.

Ludia dentata (Hmp.) TOOTHY PRINCE.

Dark brown; margin strongly toothed in both sexes; apex not markedly falcate. Outer line forewing edged with white, more distinctly than in *delegorguei*. Forewing 1¼ - 1½ inches. In Coryndon Museum from Amani (Tanganyika).

Ludia pupillata Strand, described from Ethiopia (Abyssinia), may also occur in East Africa. In this species the median line on forewing is almost straight, unlike most of the others; outer line straight in lower half, but curved in its upper portion (near costa).

As a last word here on these *Ludia* it should be pointed out that the lines on the forewing vary a little in shape within a species, or at least in some species. This makes their identification difficult.

Pseudoludia suavis Roths. SUAVE PRINCE.

Plate 21.

Antennae feathered nearly to the tip, unlike *Ludia* and *Holocerina*. Ground colour reddish-brown. Apex very strongly falcate in male. Margin not toothed. Forewing 1¼ - 1½ inches. In Coryndon Museum, from Amani (Tanganyika).

*New generic name

Holocerina n.n.

(pro *Holocera* Feld. 1874, preocc. *Holocera* de Haan 1825, in *Mollusca*; pro *Bolocera* Kirby 1892, n.n. pro *Holocera* Feld., preocc. *Bolocera* Gosse 1860, in *Coelenterata*).

Key to *Holocerina* :-

1. Median line on forewing almost straight . . . *smilax* (and *rhodesiensis*)
- Median line distinctly angled in the middle . . . 2
2. Forewing reddish-brown, including the forward edge or costa; usually smaller in size . . . *angulata*
- Forewing paler reddish, or yellowish-brown, the costa pale yellowish; larger in size . . . *agomensis*.

Holocerina smilax (Ang.) VARIABLE PRINCE.

Plate 21.

Reddish or purplish, with central area darker on forewing. Female much larger than male, the glass spot on forewing more triangular in shape. Forewing 1 - 1½ inches long, but there is one out-size female in the collection from Amani, 1¾ inches long. In Coryndon Museum the species is from Nairobi, Kitale, Nyeri, Machakos and Teita Hills (Kenya); Amani and Shinyanga (Tanganyika). Also occurs in South Africa and Rhodesia.

Holocerina rhodesiensis (Janse) RHODESIAN PRINCE.

Very like *smilax* but smaller (Forewing $\frac{7}{8}$ - $1\frac{1}{8}$ inches.); lines on forewing less clearly edged with whitish. In Coryndon Museum from Southern Rhodesia. Occurs in Nyasaland. Caterpillar feeds on *Cussonia*.

Holocerina angulata (Aur.) ANGULAR PRINCE.

Plate 21.

Smaller than *smilax* and paler; the central band on forewing shading out into the ground colour and less sharply demarcated. Medial line distinctly angled. Forewing $\frac{7}{8}$ - $1\frac{1}{8}$ inches. In Coryndon Museum from Kitale (Kenya); and Rhodesia. Occurs in West and North Africa.

Holocerina agomensis (Karsch) GOLD BORDER PRINCE.

Like *angulata* but still paler, light reddish or yellow and the costa is pale yellowish. Forewing 1 - $1\frac{1}{2}$ inches. In Coryndon Museum, from South Africa. Found in Rhodesia and West Africa.

Finally, in connection with this genus there is a peculiar species from Abercorn, Northern Rhodesia, which is probably new. I do not intend to describe it here as a new species. Detailed study must await the collection of more specimens. In shape and size the male is like *H. angulata*.

(b). Tribe *Goodiini*.*Eosia insignis* Le Cerf DOTTED PRINCE.

Plate 20.

Now here is an oddity! Some might say that no-one in their senses would imagine that this moth would be placed in the same family as insects like *Argema mimosae* and *Bunaea alcinoe*. In their right mind, however, specialists in these matters do not generally imagine these relationships. They hack and scrutinize, delve inside sometimes, measure and calculate. The consensus of opinion among them is that, barring some taxonomic upheaval, *Eosia insignis* is a genuine Emperor moth despite its queer shape and its lack of glass and eyespots. They reason this out on an analysis of body and wing structure.

It is a pink moth with toothed apex and irregular margin on forewing; no eyespots, only a few black dots on forewing and some yellow ones on hindwing. Forewing $\frac{7}{8}$ - 1 inch. In Coryndon Museum from Garba Tula, Mandera and Mtito Andei, in the drier areas of Kenya.

Goodia Holl.Key to *Goodia*:—

- | | |
|---|----------------|
| 1. Apex of forewing strongly falcate; with a yellow apical patch . . . | <i>oxytela</i> |
| Apex not or only slightly falcate; no yellow apical patch . . . | 2 |
| 2. Smaller species, forewing 1 inch long or less; colour brown or yellowish-brown . . . | <i>smithi</i> |
| Larger, forewing over 1 inch; colour orange or reddish-orange . . . | <i>kuntzei</i> |

Goodia smithi Holl. SMITH'S PRINCE.

Plate 20.

A small species, thinly scaled; pale reddish-brown to grey-brown; lines thin, black and wavy. A black crescent in middle of each forewing. Forewing $\frac{3}{4}$ - 1 inch. In Coryndon Museum a long series from Nairobi, Isiolo, Mara River, Machakos, Mtito Andei, Moyale, Mandera and Mombasa (Kenya); Ukerewe Island (Tanganyika); Kacheleba and Bukoba (Uganda).

Goodia kuntzei (Dew.) LUNAR PRINCE.

Plate 20.

Larger, more yellowish or reddish-orange in colour, the crescent on forewing longer. Inner line straighter than in *smithi*, but outer also wavy. Forewing 1 - $1\frac{1}{2}$ inches. In Coryndon Museum from Songea, Masasi, Amani and Ukerewe Island (Tanganyika); Rhodesia; Nyasaland. Also known in South Africa.

Goodia oxytela Jord. GOLDEN PRINCE.

Yellow to orange-yellow; the apex sharply falcate in male. Larger than the other two species of *Goodia* described here. Forewing with a small glass spot but no black crescent. Apex yellow. Forewing $1\frac{1}{2}$ - $1\frac{3}{4}$ inches. In Coryndon Museum from Iganga (Uganda). It occurs in the Belgian Congo.

Goodia sentosa Jord., of West Africa, is very similar to *oxytela*.

*Orthogonioptilum Swinh.*Key to *Orthogonioptilum*:-

This is only a very tentative separation of this group, of which I have seen little enough material. I think this is another genus requiring careful revision one day, when more is known about the variation in each species.

1. Ground colour pinkish-brown or reddish-brown; glass spots present in both sexes on hindwing . . . 2
Ground colour violettish- or greyish-brown, to dark brown (occasionally reddish, but then glass spots almost absent) . . . 3
2. Ground colour distinctly reddish . . . *prox*
Ground colour cinnamon-brown . . . *incana*
3. Poorly developed glass spots (at least in male); normally an irregular diffuse yellowish band in outer part of wings . . . *vestigiatum*
Well developed glass spots; no yellow patches . . . *adiegatum*

Orthogonioptilum adiegatum (Karsch) GREY PRINCE.

Plate 20.

Brown or grey-brown, with distinct, wavy median and outer lines. Glass spots well developed on forewing but not on hindwing. Forewing 1 - $1\frac{1}{2}$ inches. Known from Northern Rhodesia and West Africa, this is probably the species taken at Kampala by Sevastopulo.

Orthogonioptilum incana Sonth. FAWN PRINCE.

Plate 20.

Pinkish- or cinnamon-brown, with irregular glass spots in middle of each wing. Margin very convex in female. Forewing $1\frac{1}{4}$ - $1\frac{1}{2}$ inches. None in Coryndon Museum, but it is distributed from South to Eastern Africa.

Orthogonioptilum vestigiatum Holl. DUSKY PRINCE.

Wings brown, suffused with violet or grey; occasionally reddish. Sometimes with an irregular yellowish band of spots in outer part of wings. Forewing strongly falcate in male, as in most of these species, and rounded in female. Glass spots in male reduced to two or three dots on forewing and absent on hindwing; in female well developed on both wings. None in Coryndon Museum. Described from West Africa. It is probably the species which Howard has in his collection from Kitale.

Orthogonioptilum prox (Karsch) RED PRINCE.

Deeper red than *incana*, *vestigiatum* and *adiegatum*. Male with a few glass spots on both wings, the female similar but larger and the glass spots more united. Apex in female hooked. It is probably nearest to *incana*, but a little larger and distinctly darker. A West African species.

In the species mentioned above I have omitted the South African genera *Carnegia* and *Vegetia* and have made only brief mention of the red *Eochroa trimeni*.

REFERENCES TO ORIGINAL DESCRIPTIONS IN LITERATURE.

- Antistathm. daltonae* Tams 1935, *Stylops* IV: 97.f.1.
Argema besanti Rebel 1895, *Verh. zool.—bot. Geschw.*, Wien 45: 69.
A. mimosae (Bsd.) 1847, *App. Voy. Deleg. l'Afr. Austr.* II: 60.
Athletes ethra (Westw.) 1849, *Proc. Zool. Soc., Lond.* p.56.
A. semialba Sonth. 1904, *Prod. Soie* 4: 66.
A. steindachneri Rebel 1904, *Ann. nat. Hofmus.*, Wien 19: 65.
Bunaea alcinoe (Stoll), in Cramer 1780, *Pap. Exot.* IV: 67, Pl. CCCXXII.
Cinabra hyperbius (Westw.) 1881, in Oate's *Matabel.* p. 357.
C. pygmaea (M. & W.) 1885, *Beitr. Schmett.* 5.f.100.
Cirina forda (Westw.) 1849, *Proc. Zool. Soc., Lond.* p.52.
Decachorda aspersa Bouv. 1927, *Bull. Mus. H.n.*, Paris 33: 148.
D. aurivillii Bouv. 1930, loc. cit. IV: 2: 155. pl. VIII.
D. bouvieri kitalina Bouv. 1930, loc. cit. IV: 2: 88. pl. VIII.
D. fulvia (Druce) 1886, *Proc. zool. Soc., London.* p.411.
D. rosea Aur. 1898, *Ent. Tidskr.* p.184.
Eosia insignis Le Cerf 1911, *Bull. Mus. H.n.*, Paris p.307.
Epiphora albida (Druce) 1886, *Proc. Zool. Soc., London.* p.409.
E. antinorii Oberth. 1880, *Ann. Mus.*, Genova 15: 178.
E. atbarina Butl. 1870, *Cist. Ent.* 2: 161.
E. bauhiniæ (Guer.), *Iconogr. du Regne Animal de Couvier* T. 86.
E. lugardi Kirby 1894, *Ann. Mag. nat. Hist.* (6) XIII: 165.
E. mythimnia (Westw.) 1849, *Proc. Zool. Soc., Lond.* p.40.
E. pelosoma Roths. 1907, *Ann. Mag. nat. Hist.* (7) XX: 1.
E. rectifascia Roths. 1907, loc. cit. (7) XX: 2.
E. vacuna (Westw.) 1849, *Proc. Zool. Soc., Lond.* p.39.
Eudaemonia argiphontes Kirby 1877, *Trans. Ent. Soc., Lond.* p.20.
E. brachyura (Drury) 1772, *Ill. Exot. Ent.* 3: 39 pl. 29.
Goodia kuntzei (Dew.) 1880, *Nov. Acta. Lep.*, Ak. Nat. XLII: 2: 70.
G. oxytela Jord. 1922, *Novit. Zool.* 29: 299.
G. sentosa Jord. 1922, loc. cit. 29: 297.
G. smithi Holl. 1897, in Donaldson-Smith's "Unknown Africa" p. 413.
Gynanisa maia (Klug) 1836, *Neue Schmett.* Pl. 5.
Heniocha apollonia (Cr.) 1779, *Pap. Exot.* III pl. 250.
H. marnois Rog. 1891, *Verh. zool.—bot. Gesch.*, Wien 41: 565.
Holocerina agomensis (Karsch) 1896, *Ent. Nachr.* 22: 253.
H. angulata (Aur.) 1893, *Ent. Tidskr.* 14: 201.
H. rhodesiensis (Janse) 1918, *Ann. Durb. Mus.* 2: 83.
H. smilax (Ang.) Westw. 1849, *Proc. Zool. Soc., Lond.* p.59.
Imbrasia deyrollei Thoms. 1858, *Arch. Ent.* 2: 344 (Frontisp.)
I. eblis (Streck.) 1876, *Lepidopt.* 121.
I. epimethea (Drury) 1772, *Ill. Exot. Ent.* 2: 24 Pl. 13.
I. macrothyris (Roths.) 1906, *Novit. Zool.* 13: 189.
Leucopteryx ansorgei (Roths.) 1897, *Novit. Zool.* 4: 309.
L. mollis (Butl.) 1889, *Trans. Ent. Soc., Lond.* p.391.
Lobobunaea acetes (Westw.) 1849, *Proc. Zool. Soc., Lond.* p.53.
L. alinda (Drury) 1772, *Ill. Exot. Ent.* 3: 26 pl. 19.
L. ammon (Karsch) 1898, in Werther, *Ost—Afr.* p.314.
L. angasana (Westw.) 1849, *Proc. Zool. Soc., Lond.* XVII: 52.
L. christyi (Sharpe) 1898, *Ann. Mag. nat. Hist.* (7) III: 371.
L. cyrene Weym. 1909, *Iris* XXII: 1.

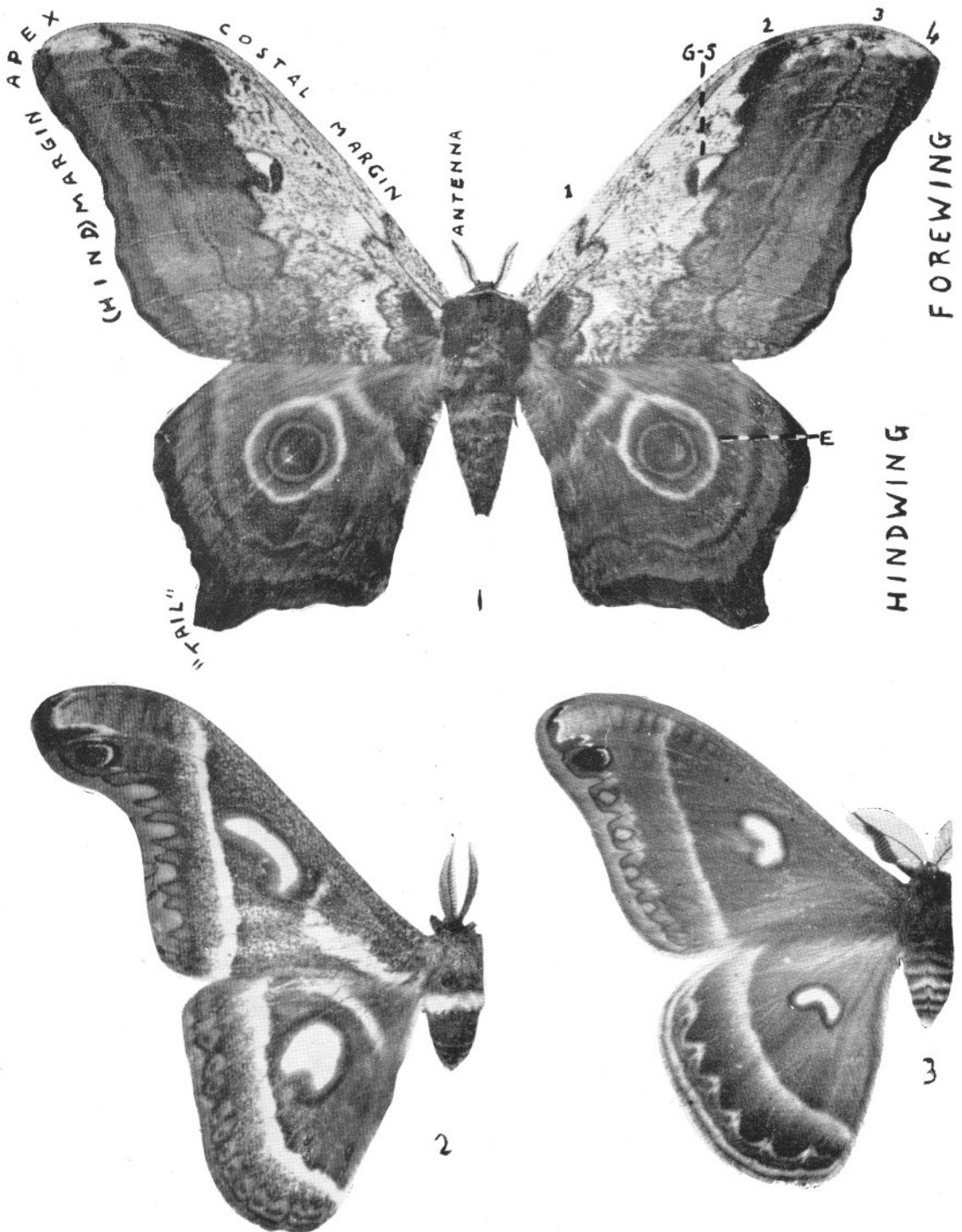
- L. epithyrena* (M. & W.) 1885, Beitr. Schmiett. ff. 86, 87.
L. erythrotres (Karsch) 1892, Berl. ent. Zeit. XXXVII.
L. goodii (Holl.) 1893, Psyche 6: 390. Pl. 9 ff. 3,4.
L. heyeri (Weym.) 1896, Berl. ent. Zeit. XLI: 81.
L. jamesoni (Druce), in Jameson's Story R. Column p.448.
L. laurae Strand 1912, Archiv. f. Naturg. 78A. 1 p. 141.
L. morlandi Roths. 1907, Ann. Mag. nat. Hist. (7) 20: 5.
L. natalensis (Aur.) 1893, Ent. Tidskr. p.203.
L. phaeax Jord. 1910, Novit. Zool. XVII: 255.
L. phaedusa (Drury) 1772, Ill. Exot. Ent. 3: 34Pl. 24.
L. rosea (Sonth.) 1899, Ann. Lab. Soie p.155.
L. saturnus (F.) 1793, Ent. Syst. 3: 409.
L. tanganicæ (Sonth.) 1899, Ann. Lab. Soie p.153.
L. tyrrenhena (Westw.) 1849, Proc. Zool. Soc., Lond. p.51.
Ludia arguta Jord. 1922, Novit. Zool. 29: 272.
L. delegorguei (Bsd.) 1847, App. Voy. Deleg. Afr. Austr. II: 601.
L. dentata (Hmp.) 1891, Ann. Mag. nat. Hist. (6)7: 184.
L. goniata Roths. 1907, Ann. Mag. nat. Hist. (7)20: 9.
L. hansali Feld. 1865, Reise Nov., Lep. pl.89.
L. orinoptena Karsch 1892, Berl. ent. Zeit. XXXVII: 504.
L. pupillata Strand 1912, Iris 25: 116.

Melanocera menippe (Westw.) 1849, Proc. Zool. Soc., Lond. p.43.
M. sufferti (Weym.) 1896, Berl. Ent. Zeit. XLI: 85.
Micragone ansorgei Roths. 1907, Ann. Mag. nat. Hist. (7)20: 80.
M. bilineata Roths. 1907, loc. cit. (7) 20: 80.
M. cana Aur. 1893, Ent. Tidskr. p.202.
M. trefurthi Strand 1907, Ent. Rundsch. 26: 18.

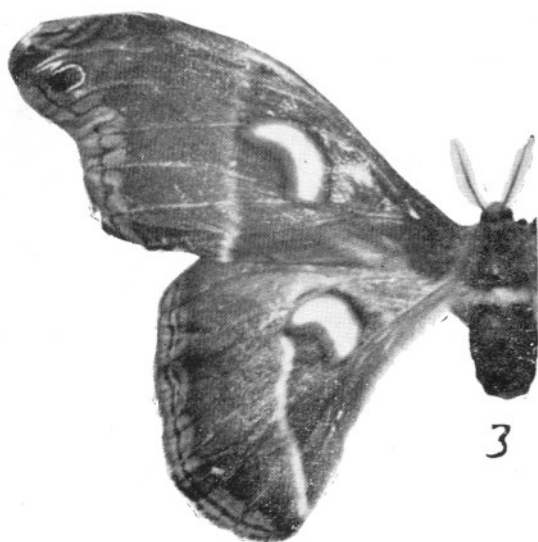
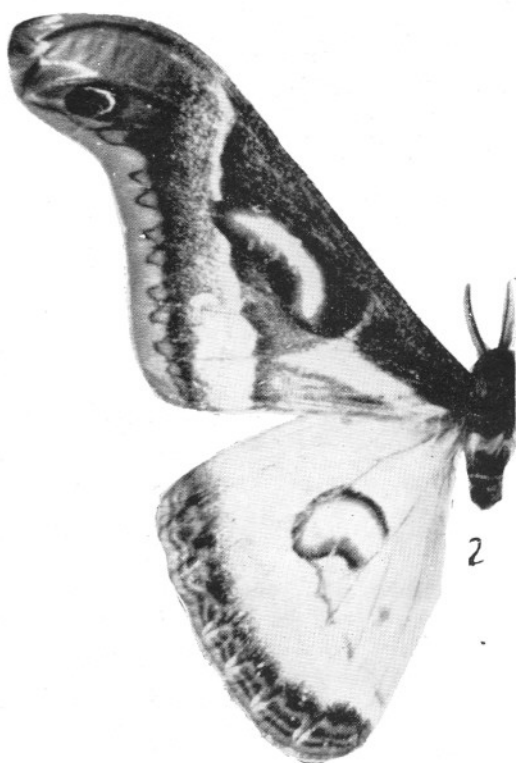
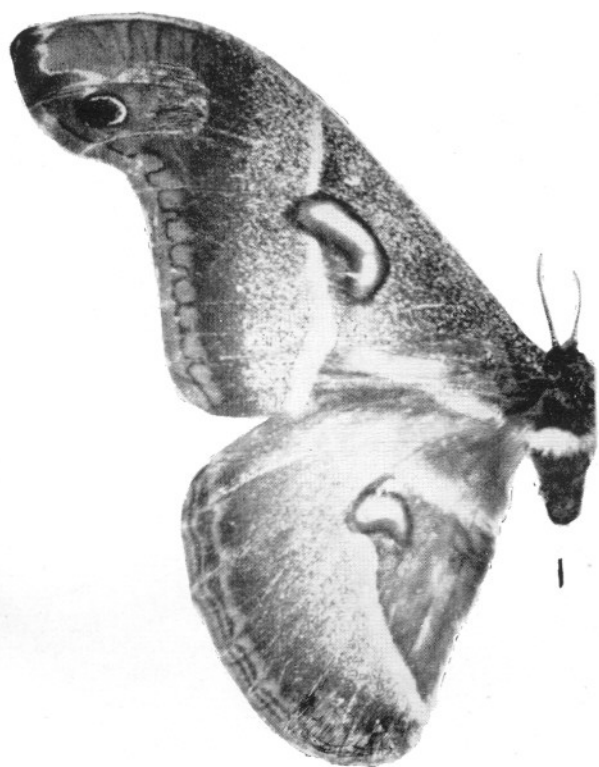
Nudaurelia amathusia Weym. 1909, Iris XX: 8.
N. anna (M. & W.) 1885, Beitr. Schmiett. 5f. 88.
N. anthina (Karsch) 1892, Ent. Nachr. XVIII: 353.
N. arabella jacksoni Jord. 1908, Novit. Zool. 15: 255.
N. arata (Westw.) 1849, Proc. Zool. Soc., Lond. p.41 f.2.
N. aurantiaca Roths. 1895, Novit. Zool. 2: 42.
N. belina (Westw.) 1849, Proc. Zool. Soc., Lond. p.4.
N. carnegiei Janse 1918, Ann. Durb. Mus. II. 2: 78.
N. chevalia Stoneham 1933, Bull. Stoneham Mus., 16 (Nov.)
N. cleoris (Jord.) 1910, Novit. Zool. 17: 473.
N. conradsii Rebel 1906, Iris XIX p.98.
N. cytherea (F.) 1775, Syst. Ent. p.557.
N. dione (F.) 1793, Ent. Syst. (3)1: 410.
N. dolabella (Druce) 1886, Proc. Zool. Soc., Lond. p.409.
N. emini (Butl.) 1888, Proc. Zool. Soc., Lond. p.84.
N. gueinzii (Karsch) Strand 1872, Stett. Ent. Zeit. XXXIII: 120.
N. hersilia (Westw.) 1849, Proc. Zool. Soc., Lond. 42pl. IX.
N. kasaiensis Bouv. 1928, Bull. Mus. H.n., Paris 33: 350.
N. krucki Her. 1930, Mitt. Zool. Mus., Berlin 16: 518 Pl.8: 1,2.
N. licharbas (M. & W.) 1885, Beitr. Schmiett. 5f. 89.
N. lutea Bouv. 1930, Bull. Hill. Mus. IV: 2Pl. X.
N. macrophthalma (Kirby) 1881, Ent. Mon. Mag. 18: 146.
N. macrops Rebel 1918, Ann. naturh. Hofmus., Wien XXXI: 166.
N. mpalensis Sonth. 1899, Ann. Lab. Soie 9: 152.
N. myrtea Rebel 1918, Ann. naturh. Hofmus., Wien XXXI: 162.
N. nictitans (F.) 1775, Syst. Ent. p.558.
N. oberthueri Bouv. 1927, Bull. Mus. H.n., Paris 33: 72.
N. oubie (Guer.) 1849, in Lefebvre's Voy. Abyss. 6: 387.
N. phidias Weym. 1909, Iris XXII: 5.

- N. rectilineata* Sonth. 1899, Ann. Lab. Soie 9: 151.
N. reducta Rebel 1918, Ann. naturh. Hofmus., Wien XXXI: 166.
N. rhodina Roths. 1907, Ann. Mag. nat. Hist. (7)20: 3.
N. rhodophila (Walk.) 1869, Proc. nat. Hist. Soc., Glasgow 1: 343.
N. richelmanni Weym. 1909, Iris XXII: 6.
N. rubra Bouv. 1927, Rev. Zool., Afr. 15: 146 f.5.
N. said (Oberth.) 1878, Etudes d'Ent. 3: 34.
N. sonthonnaxi Weym. 1907, Iris XX: 46.
N. staudingeri (Aur.) 1893, Ent. Tidskr. p.205.
N. tyrrhea (Cr.) 1777, Pap. Exot. 1 pl.46.
N. ungemachti Bouv. 1928, Bull. Mus. H.n., Paris 33: 348.
N. wahlbergi (Bsd.) 1847, App. Voy. Deleg. Afr. Austr. II: 600.
N. zambesina (Walk.) 1865, Cat. Lep., Het., B.M. XXXII: 525.
Orthogoniopitulum adiegatum (Karsch) 1892, Berl. Ent. Zeitschr. XXXVII: 501.
O. incana Sonth. 1899, Ann. Lab. Soie 9: 12.
O. monochromum (Karsch) 1892, Berl. Ent. Zeit. 37: 502.
O. prox (Karsch) 1892, loc. cit.
O. vestigiatum Holl. 1893, Ent. News. Philad. 4: 180.
Parusta thelxinoe Fawc. 1915, Proc. Zool. Soc., Lond: 103. pl.1: 16.
P. xanthops Roths. 1907, Ann. Mag. nat. Hist. (7)20: 6.
Pselaphelia dentifera (M. & W.) 1885, Beitr. Schmett. 5 f. 115.
P. flavivitta (Walk.) 1862, Trans. Ent. Soc., London. p.275.
P. gemmifera (Butl.) 1878, Proc. Zool. Soc., Lond. p.387.
Pseudantheraea arnobia (Westw.) 1849, Proc. Zool. Soc., Lond. p.142.
Pseudaphelia ansorgei Roths. 1898, Novit—Zool. 5: 101.
P. apollinaris (Bsd.) 1847, App. Voy. Deleg. Afr. Austr. II: 601.
P. flavomarginata Gaede 1915, J. Ent. Zeitschr. (Guben) 9: 172.
P. roseibrunnea Gaede 1926, Seitz' Macrolep. XIV: 336.
Pseudoludia suavis Roths. 1907, Ann. Mag. nat. Hist. (7)20: 9.
Tagoropsis flavinata (Walk.) 1865, Cat. Lep., Het., B.M. 32: 273.
T. hanningtoni Butl. 1883, Ann. Mag. nat. Hist. (5)12: 106.
T. lupina Roths. 1907, Ann. Mag. nat. Hist. (7)20: 7.
T. sabulosa Roths. 1907, loc. cit.
T. songeana Strand 1911, J. Ent. Zeitschr. (Guben) 5: 286.
Urota sinope Westw. 1849, Proc. Zool. Soc., Lond. p.60.
Usta angulata Roths. 1895, Novit. zool. 2: 50.
U. terpsichore (M. & W.) 1885, Beitr. Schmett. 5 f. 113.
U. wallengreni (Feld.) 1859, Ent. Mon., Wien 3: 323.

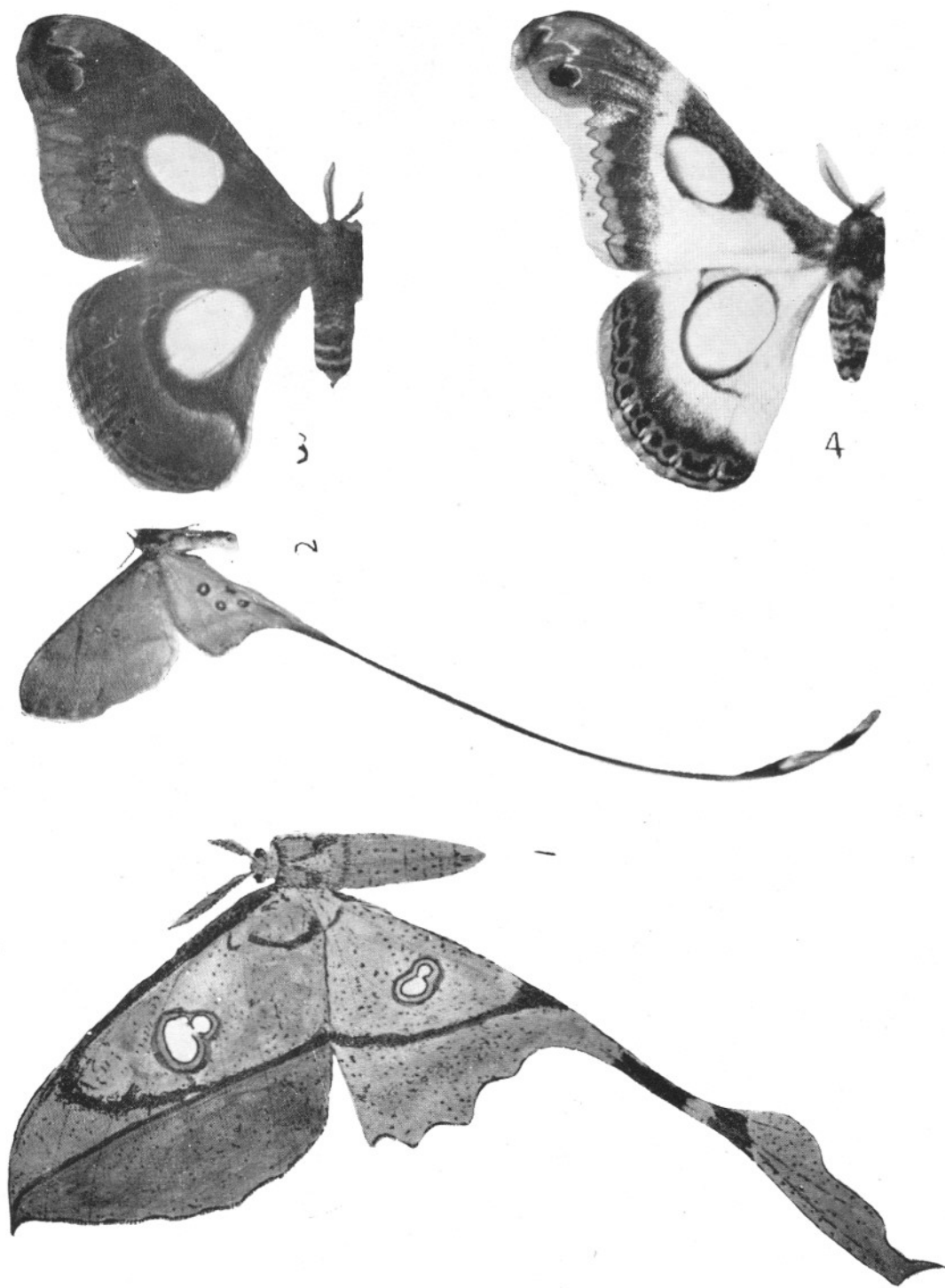
Footnote—In this paper the genus HOLOCERA Feld, has acquired a new name, HOLOCERINA, for reasons of priority.



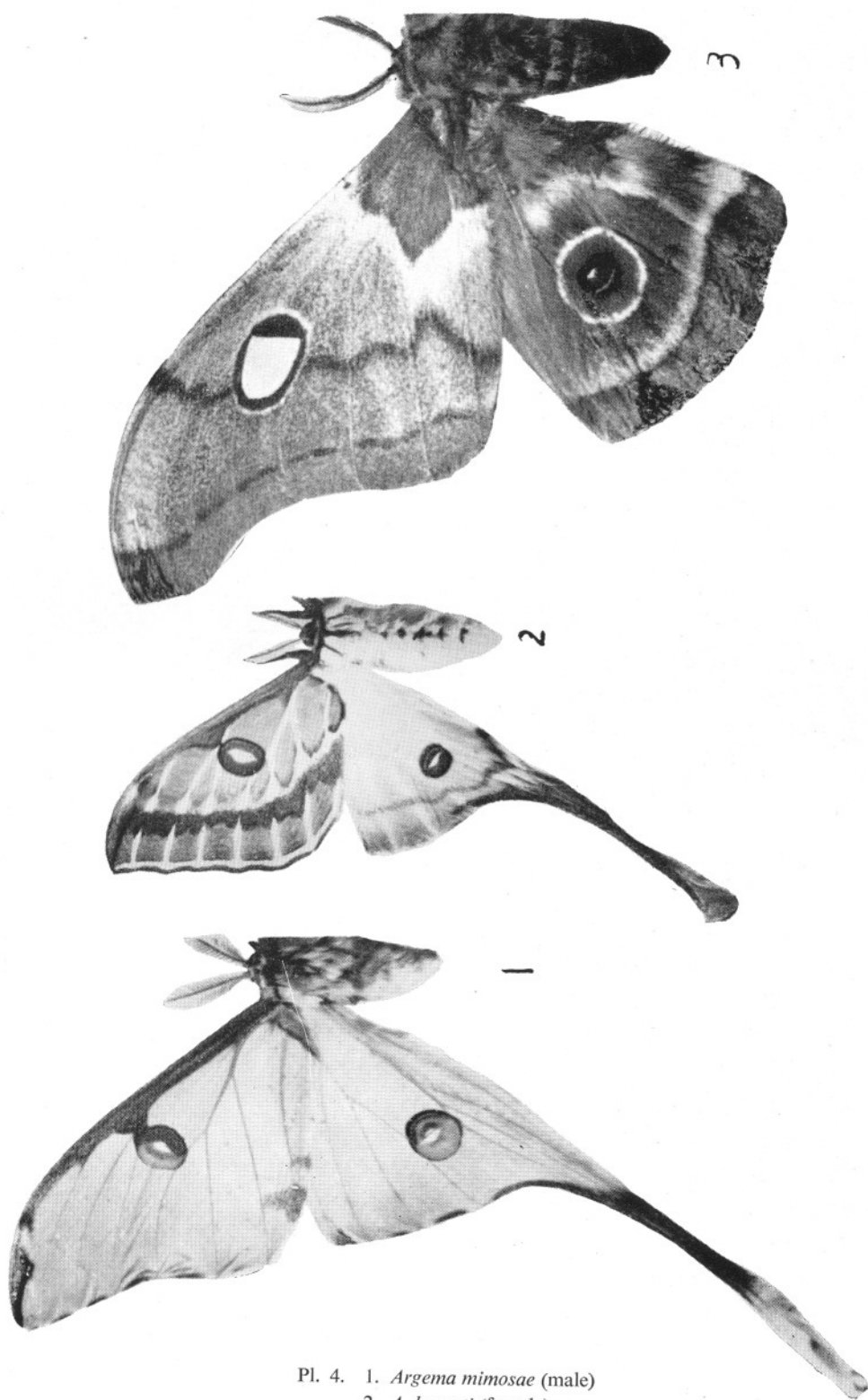
Pl. 1. *Athletes steindachneri*, showing areas and markings on wings.
 Lines on the Forewing: 1=Inner, 2=medial, 3=outer,
 4=Submarginal. G-S=Glass spot, E=Eyespot.
 Note the falcate apex of forewing in *EP. rectifascia*.
 2. *Epiphora rectifascia* (male) 3. *Epiphora antinorii* (male)



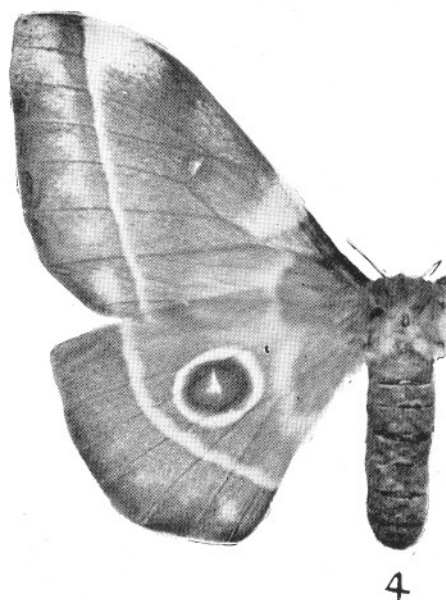
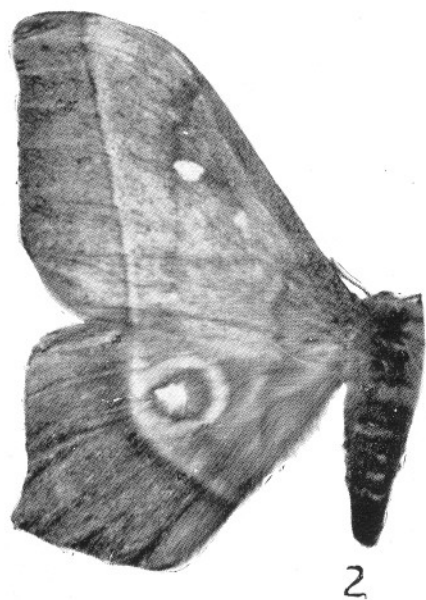
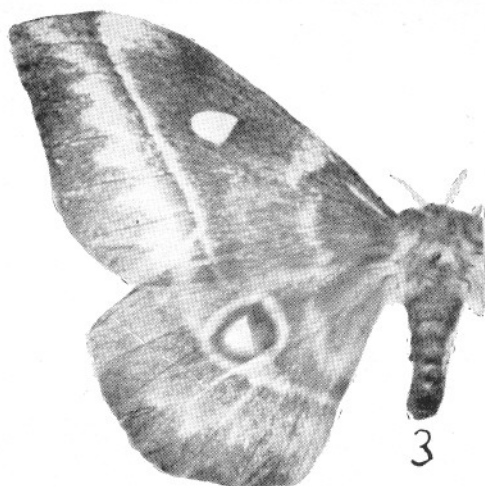
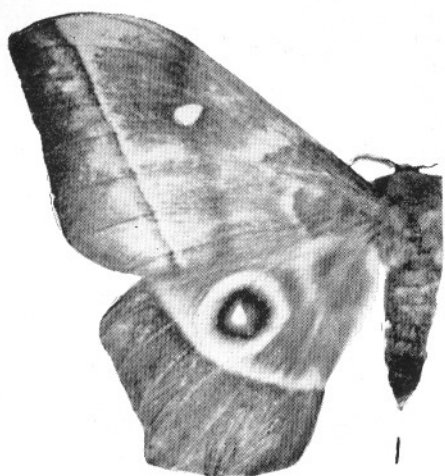
Pl. 2. 1. *Epiphora vacuna* (male) 2. *E. albida* (male)
3. *E. pelosoma* (female) 4. *E. mythimnia* (female)



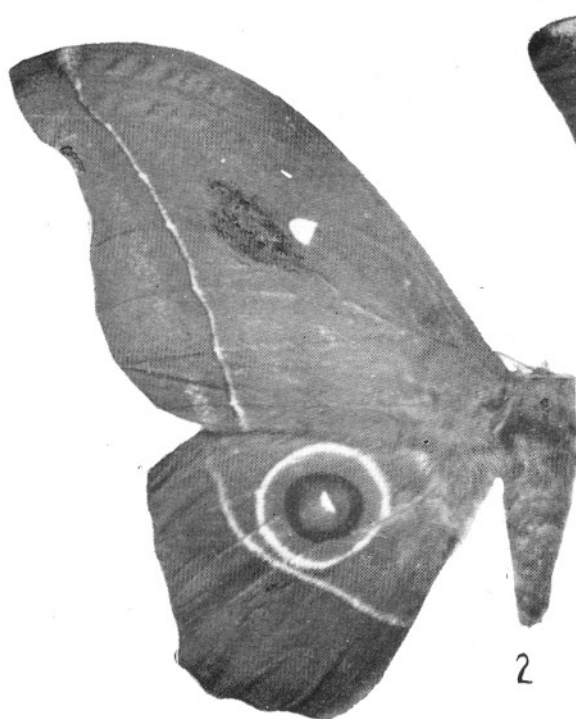
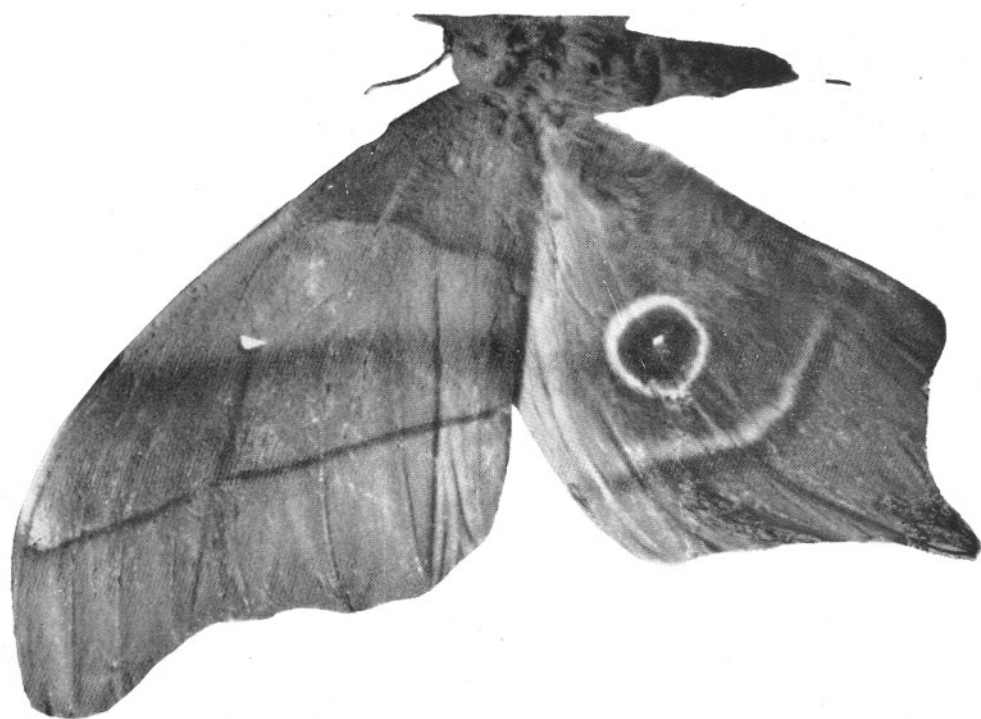
Pl. 3. 1. *Antistathmoptera daltonae* (female) (after Tams, in "Stylops" 4.p.98)
 2. *Eudaemonia brachyura* (female)
 3. *Epiphora lugardi* (female)
 4. *E. bauhinae* (male)



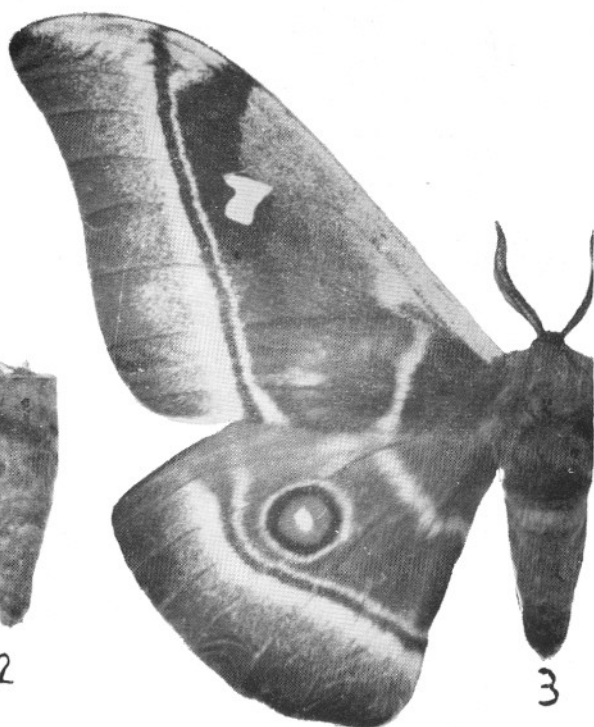
Pl. 4. 1. *Argema mimosae* (male)
2. *A. besanti* (female)
3. *Bunaea alcinoe* (male)



Pl. 5. *Imbrasia epimethea*
1, 2. males 3, 4. females



2

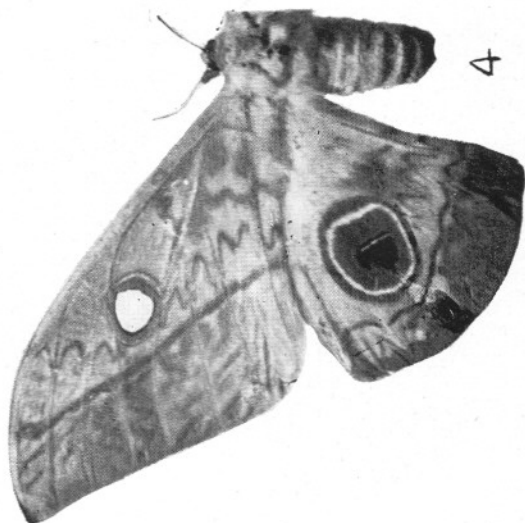
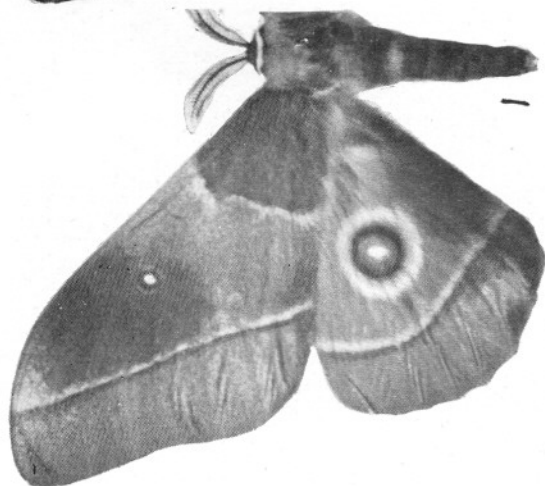
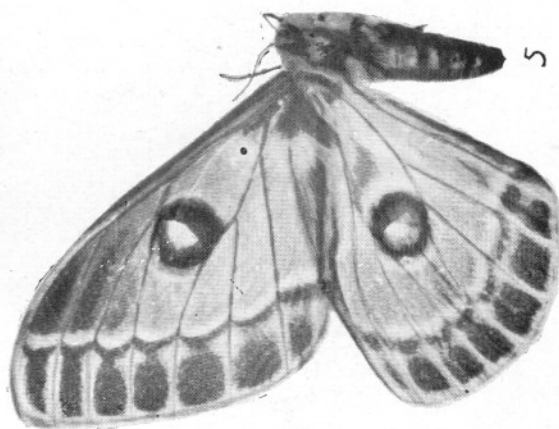
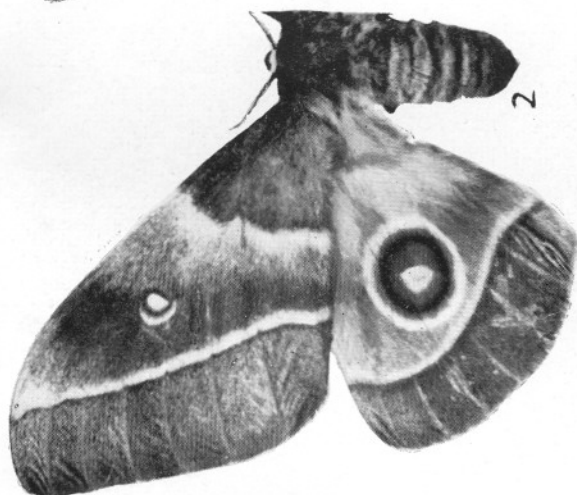
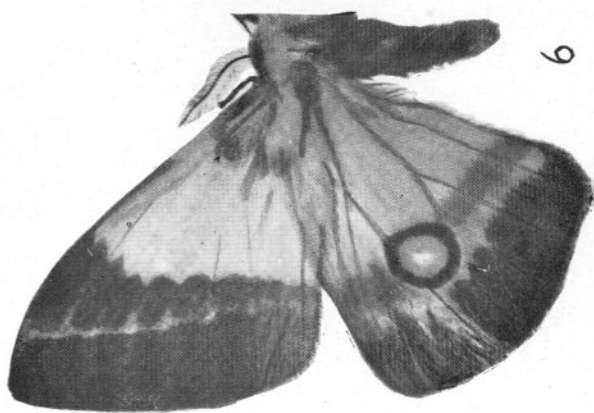
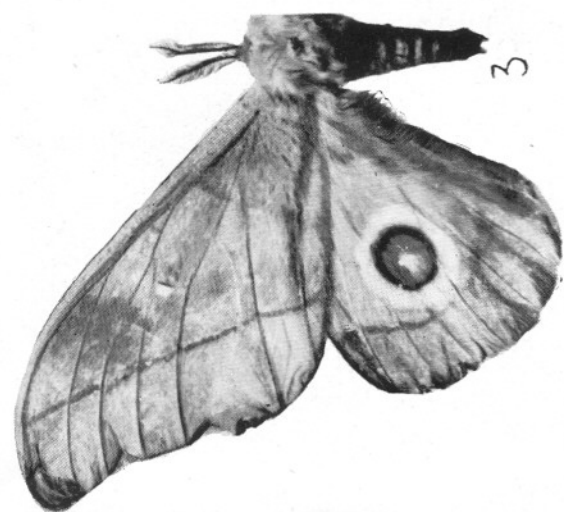


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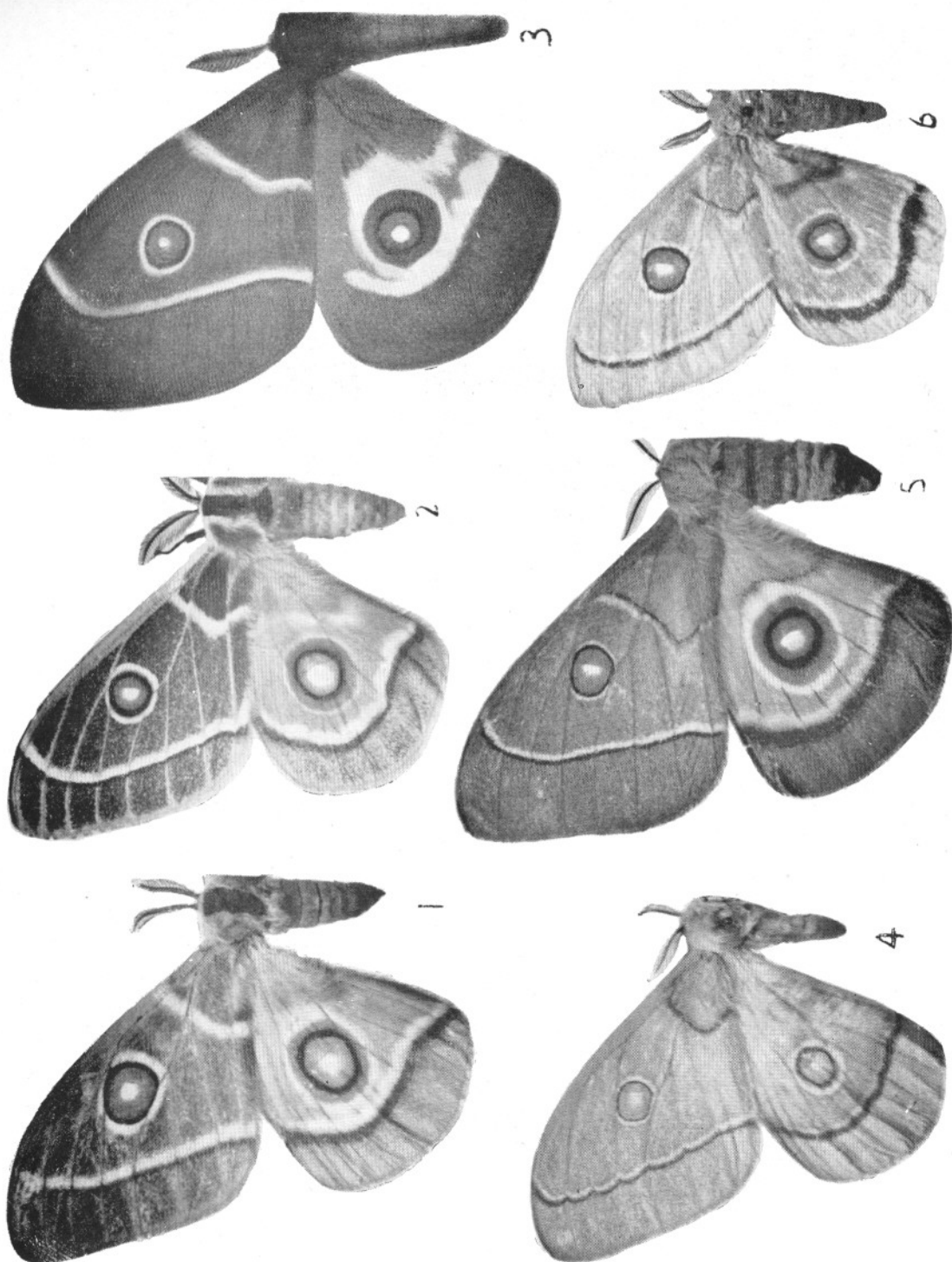
Pl. 6. 1 *Imbrasia deyrollei* (male)
2. *I. eblis* (male)
3. *I. macrothyris* (male)



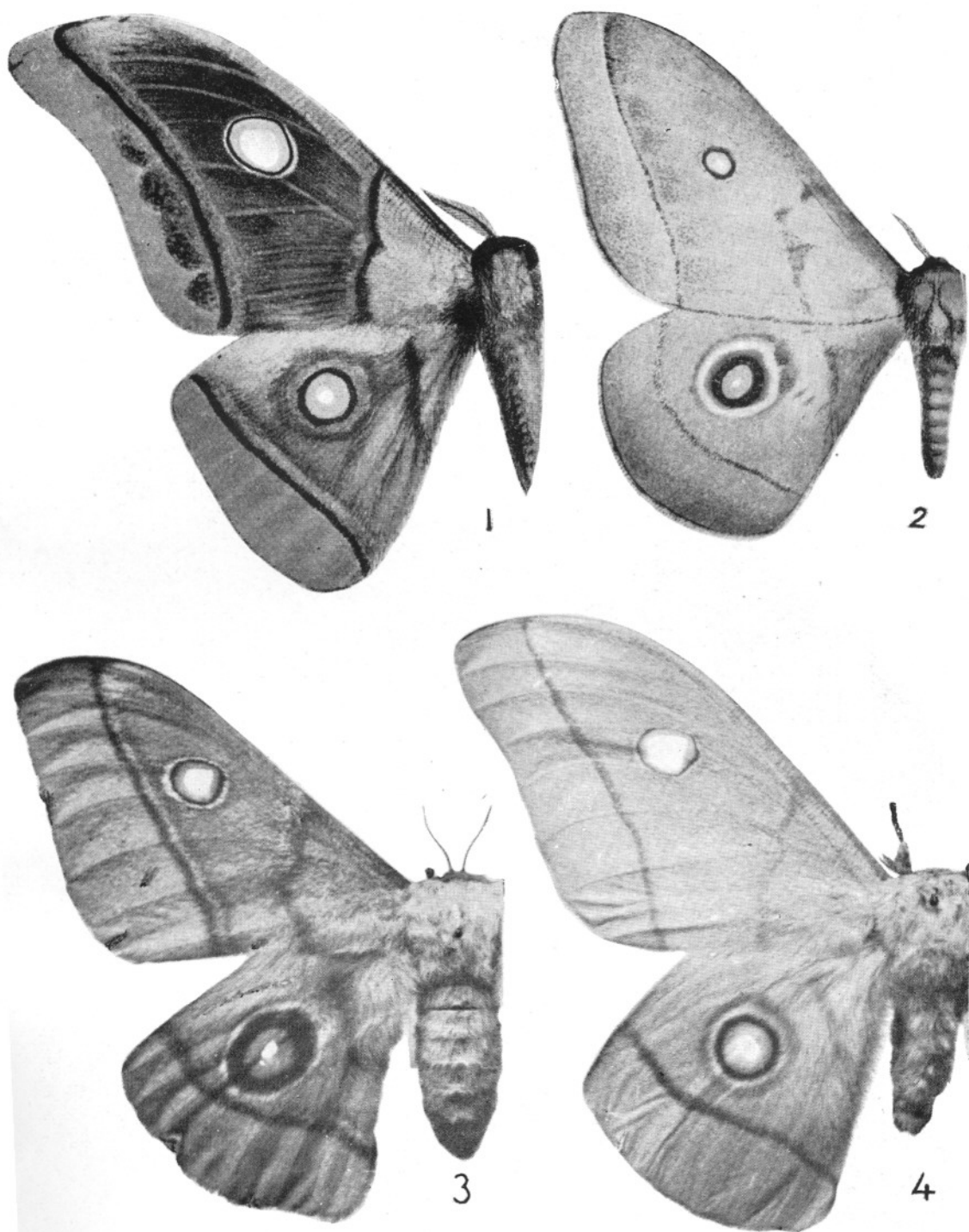
Pl. 7. 1. *Melanocera sufferti* (male) 2. *Nudanrelia tyrrhea* (female)
 3. *N. zambesina* (female) 4. *N. rhodophila* (male)
 5. *N. conradi* (male) 6. *N. staudingeri* (male)
 7. (*N. sonthonnaxi* male)



Pl. 8. 1. *Nudaurelia belina* (male) 2. (female)
 3. *N. chevalia* (male) 4. *N. arata* (female)
 5. *N. arabella jacksoni* (female) 6. *N. dolabella* (male)



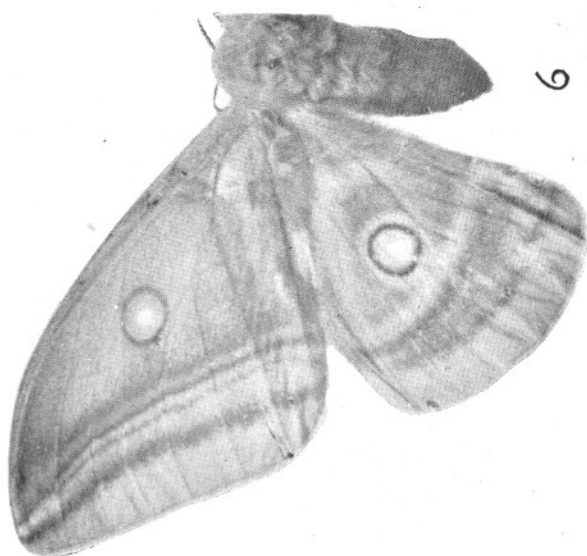
Pl. 9. 1. *Nudaurelia oubie zaddachi* (male) 2. *N. oubie rothschildi* (male)
 3. *N. phidias* (male) [after Seitz'xiv Pl. 51.] 4. *N. hersilia* (male)
 5. *N. licharbas* (female) 6. *N. macrophthalma* (male)



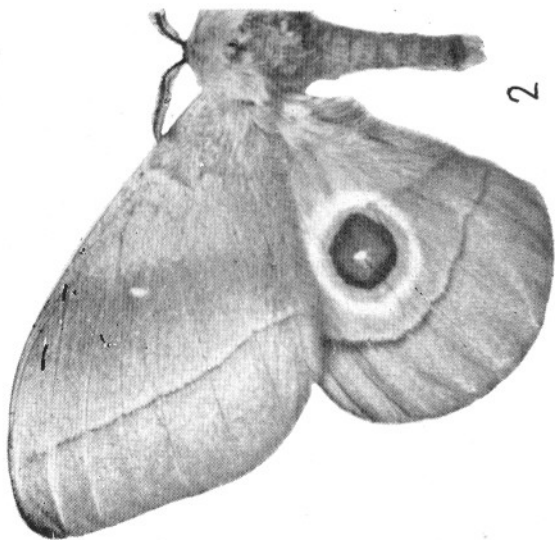
Pl. 10. 1. *Nudaurelia macrops* (male) [after Seitz'xiv. Pl. 51]
 2. *N. richelmanni* (male) [after Seitz'xiv. Pl. 50]
 3. *N. cytherea* (female)
 4. *N. krucki* (male)



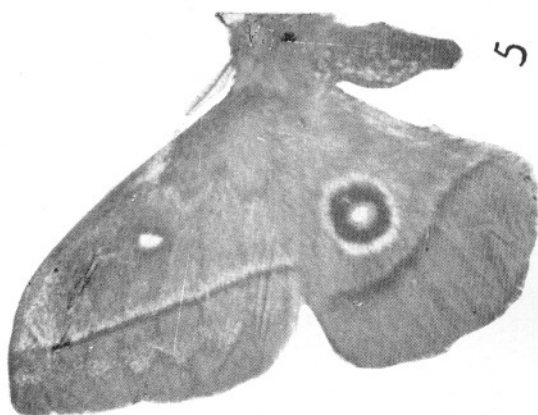
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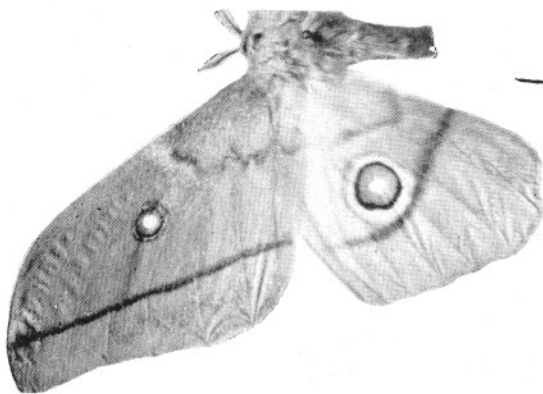
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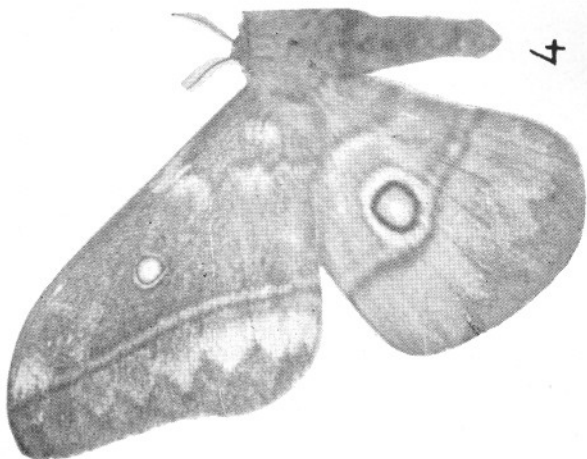
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5

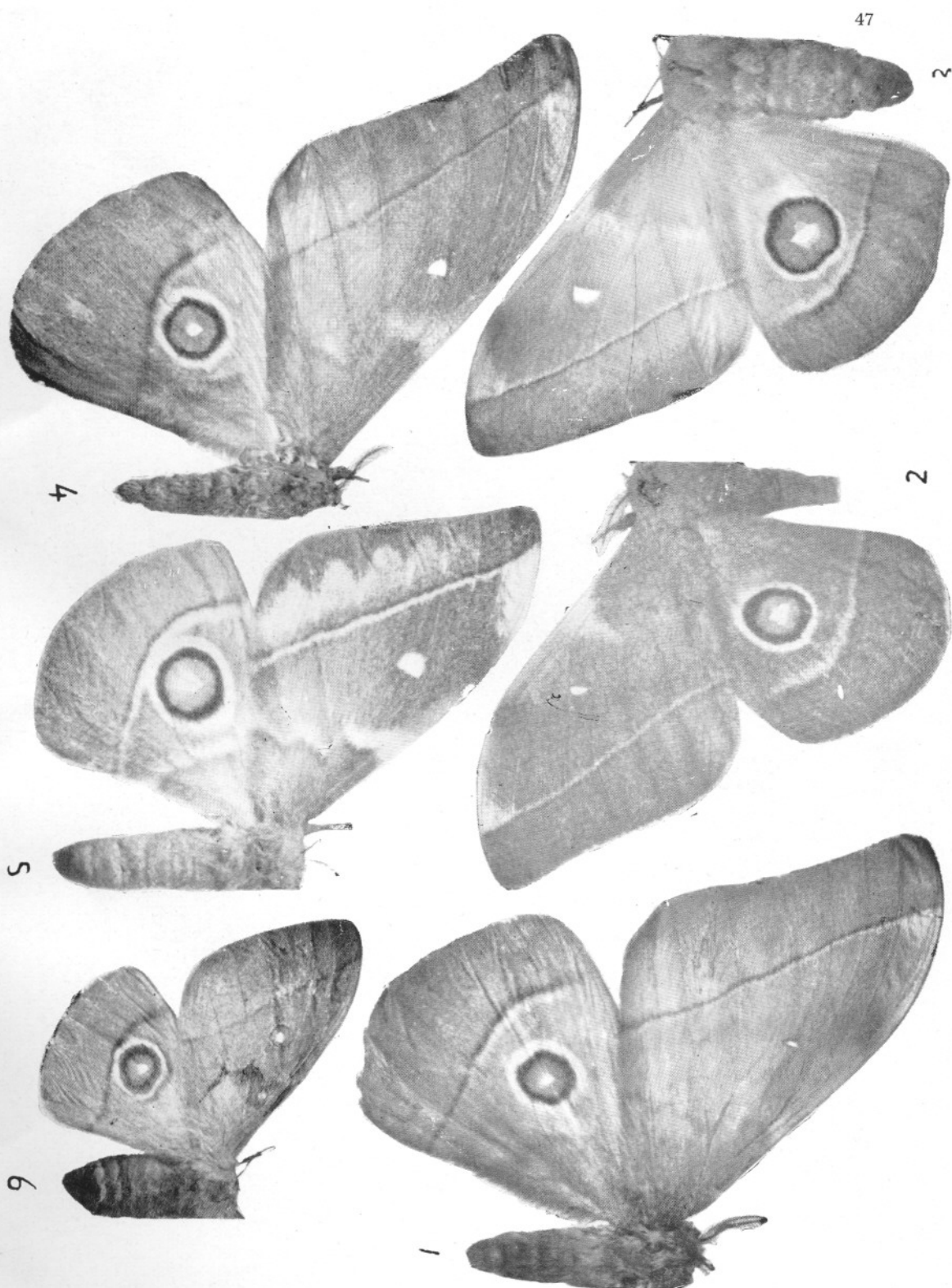


1

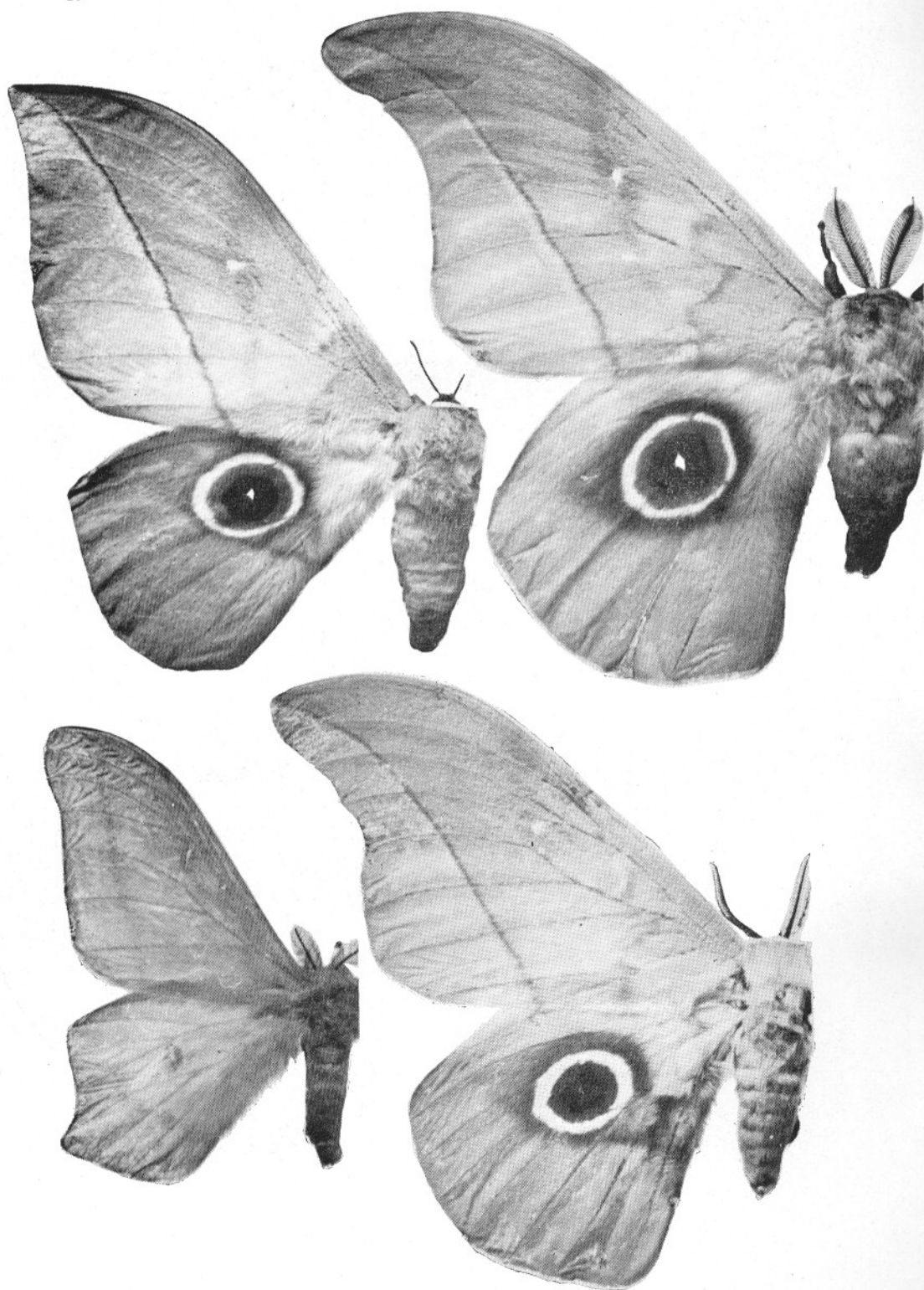


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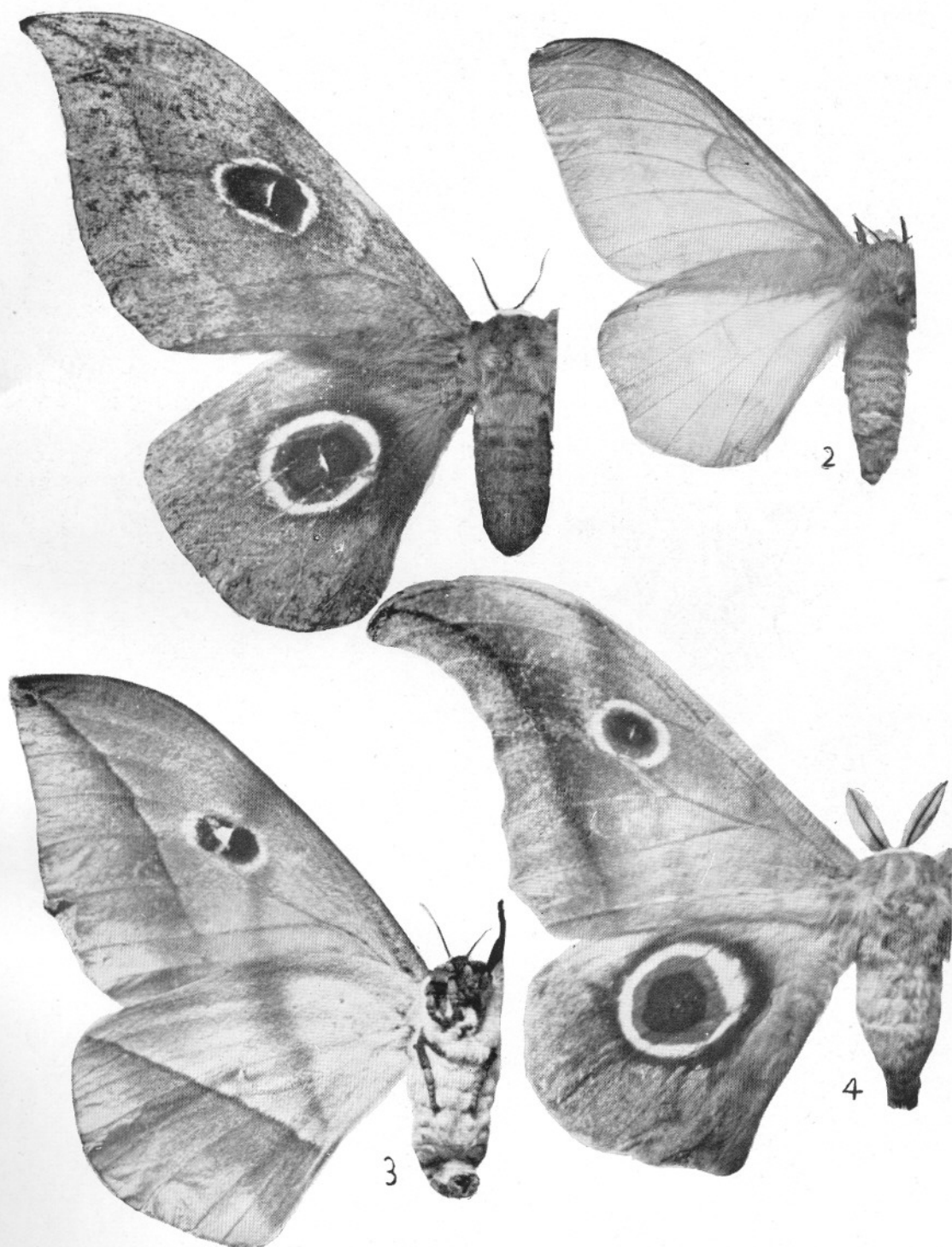
Pl. 11. 1. *Nudaurelia dione* (male) 2. *N. nictitans* (male) 3. *N. emini* (male)
4. *N. wahlbergi* (male) 5. *N. rhodina* (male) 6. *N. anna* (female)



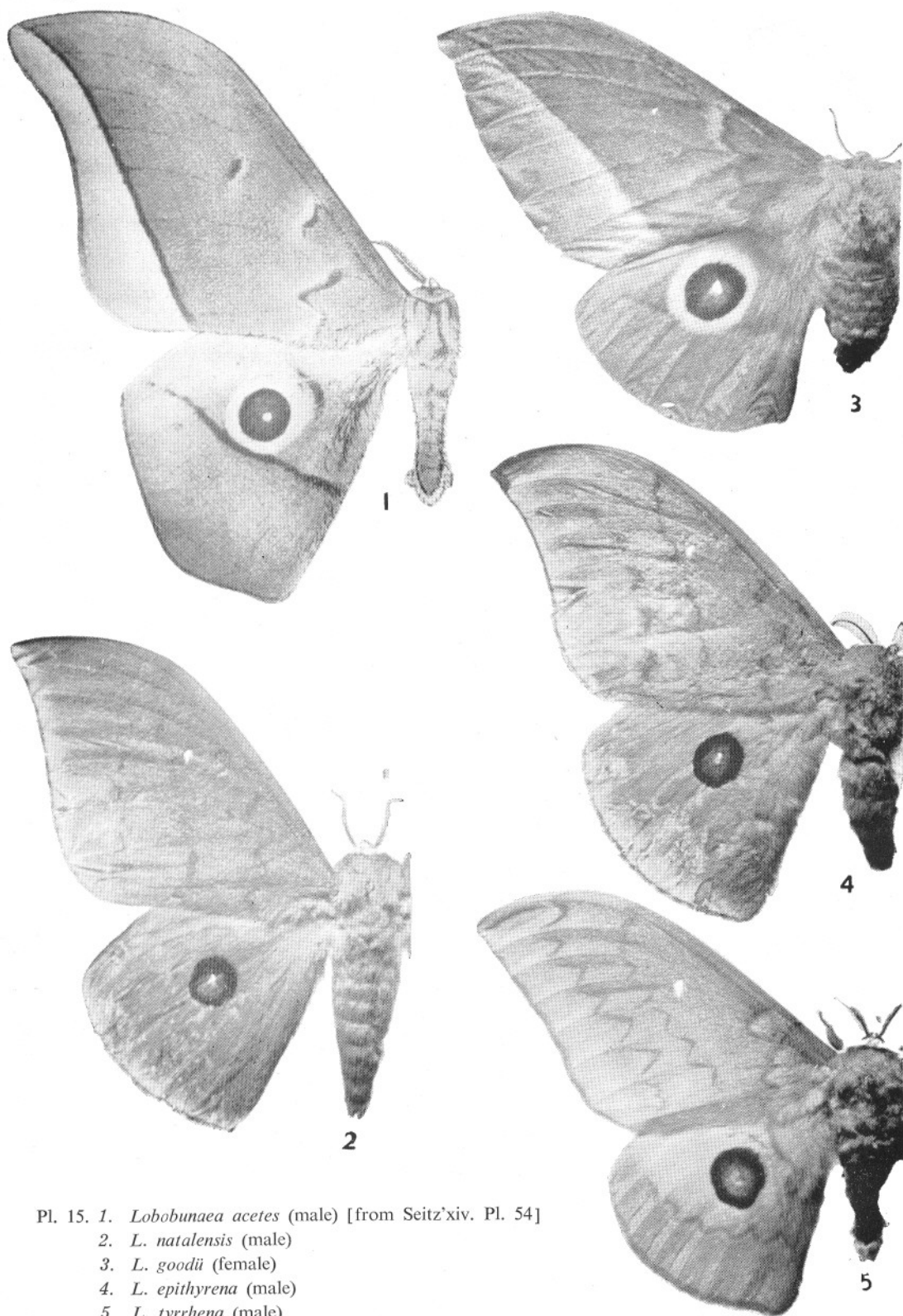
Pl. 12. 1. *Ndaurelia gueinzii*, form *venus* (male) 2. *N. gueinzii* (male)
3. (female) 4. *N. myrtea* (male) 5. *N. anthina* (female) 6. *N. reducta* (female)



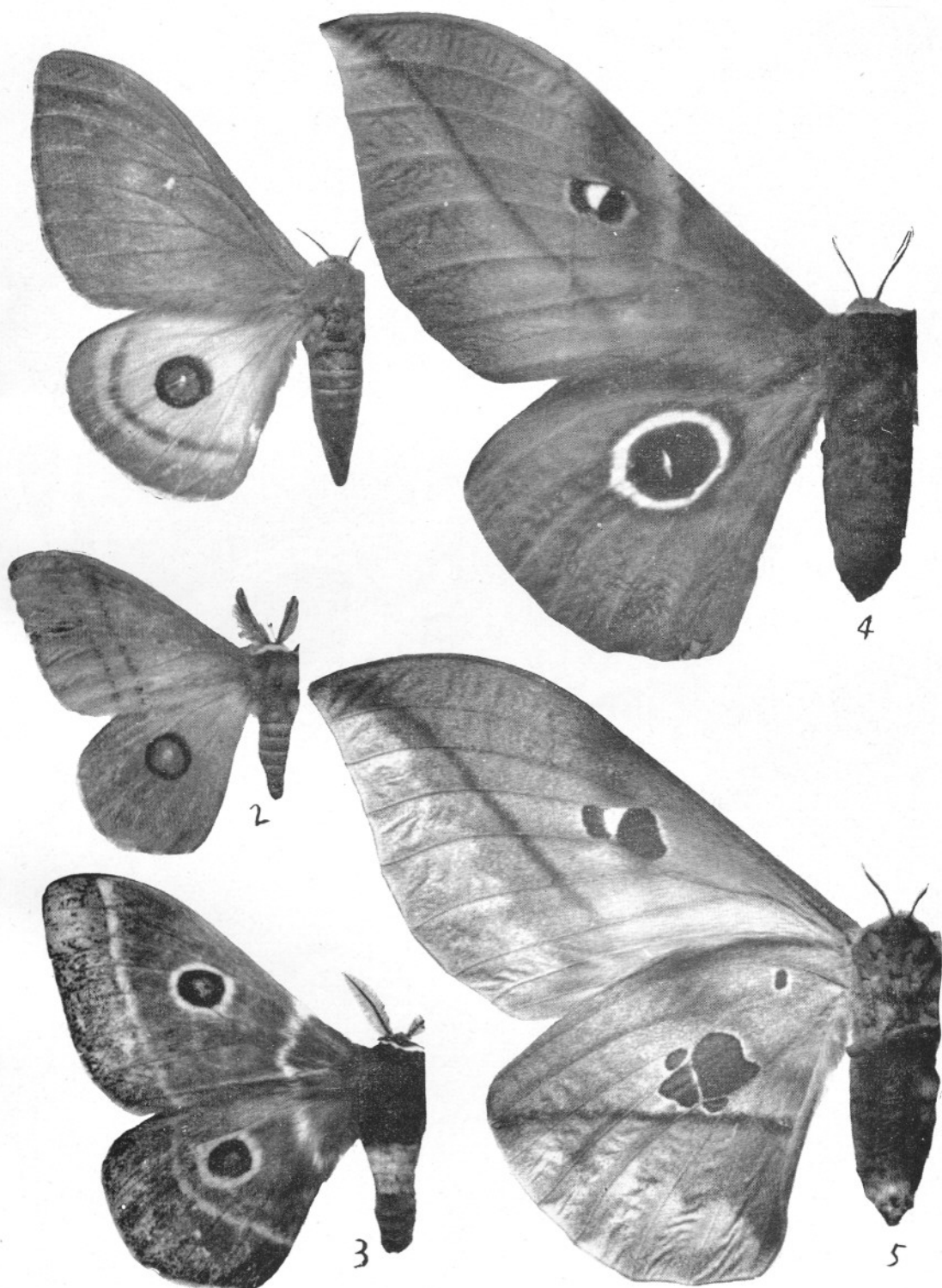
Pl. 1. 13. *Lobobunaea saturnus* (female) 2. (male)
3. *Cirina forda* (male) 4. *Lobobunaea angasana* (male)



Pl. 14. 1. *Lobobunaea phaeax* (female) 2. *Cirina forda* (female)
3. *Lobobunaea saturnus* (female, underside) 4. *L. christyi* (male).



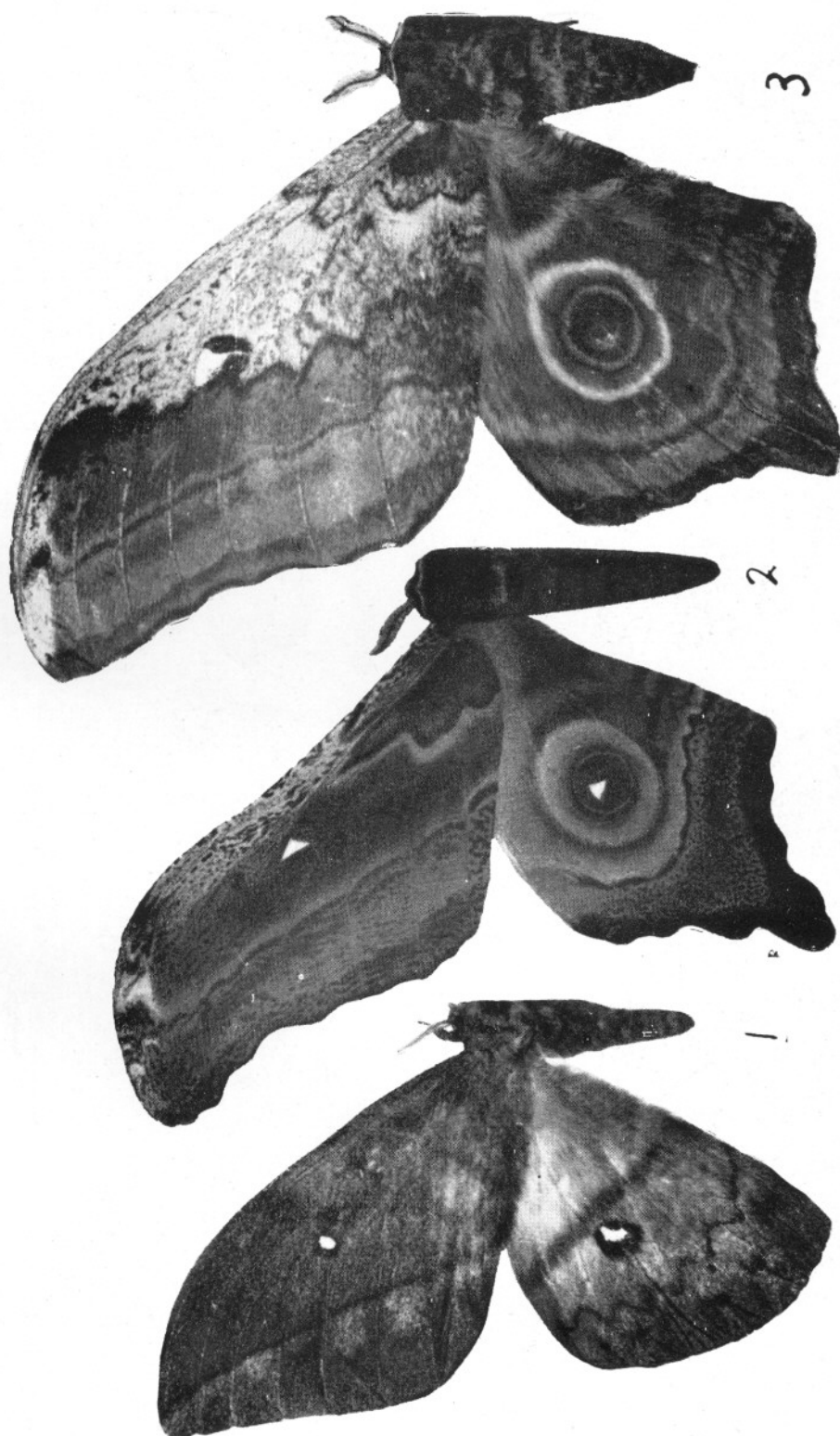
Pl. 15. 1. *Lobobunaea acetes* (male) [from Seitz'xiv. Pl. 54]
 2. *L. natalensis* (male)
 3. *L. goodii* (female)
 4. *L. epithyrena* (male)
 5. *L. tyrrhena* (male)



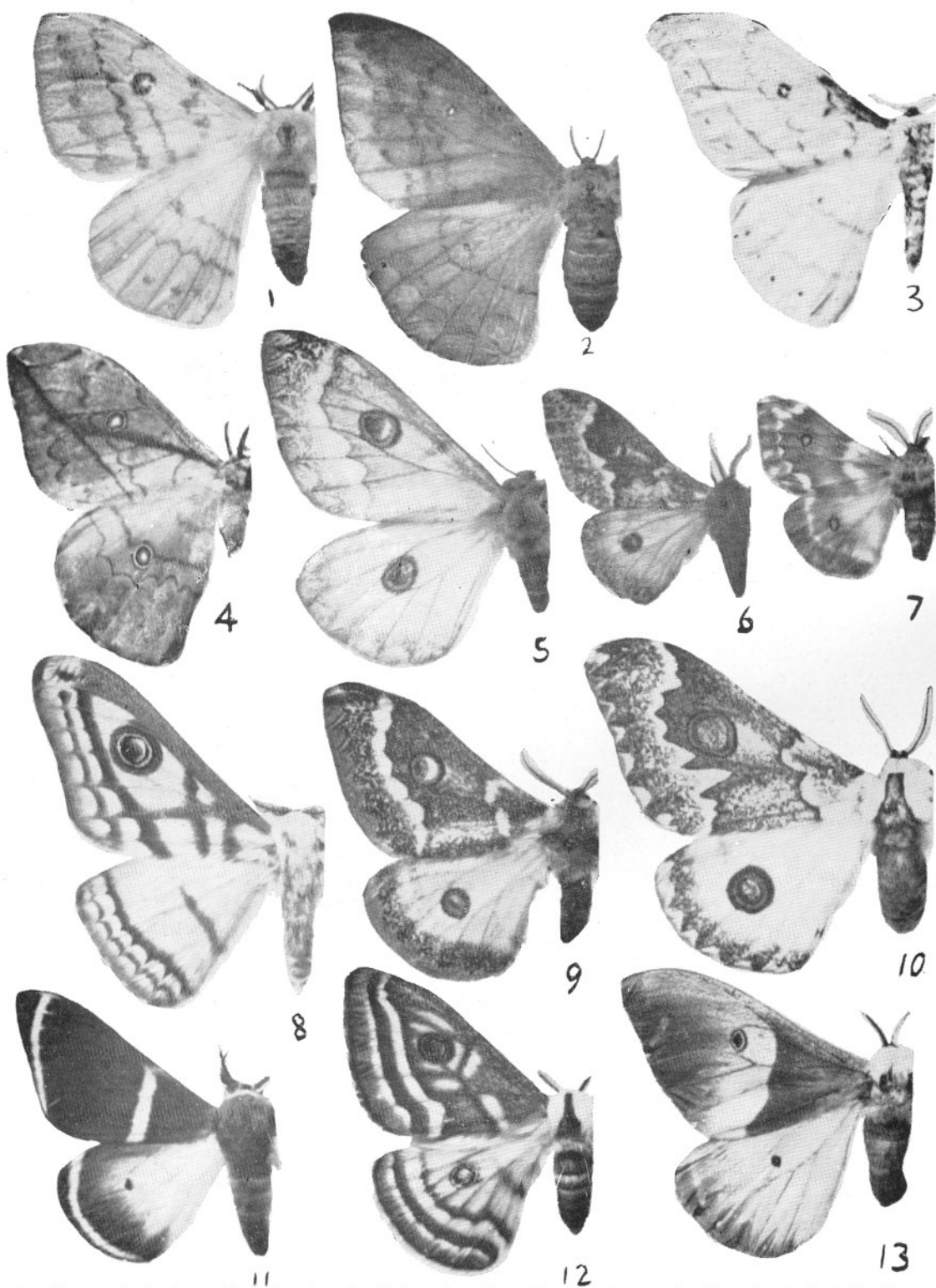
Pl. 16. 1. *Cinabra hyperbius* (female) 2. *C. pygmaea* (male)
 3. *Melanocera menippe* (male) 4,6. *Lobobunaea phaedusa* (female and underside)



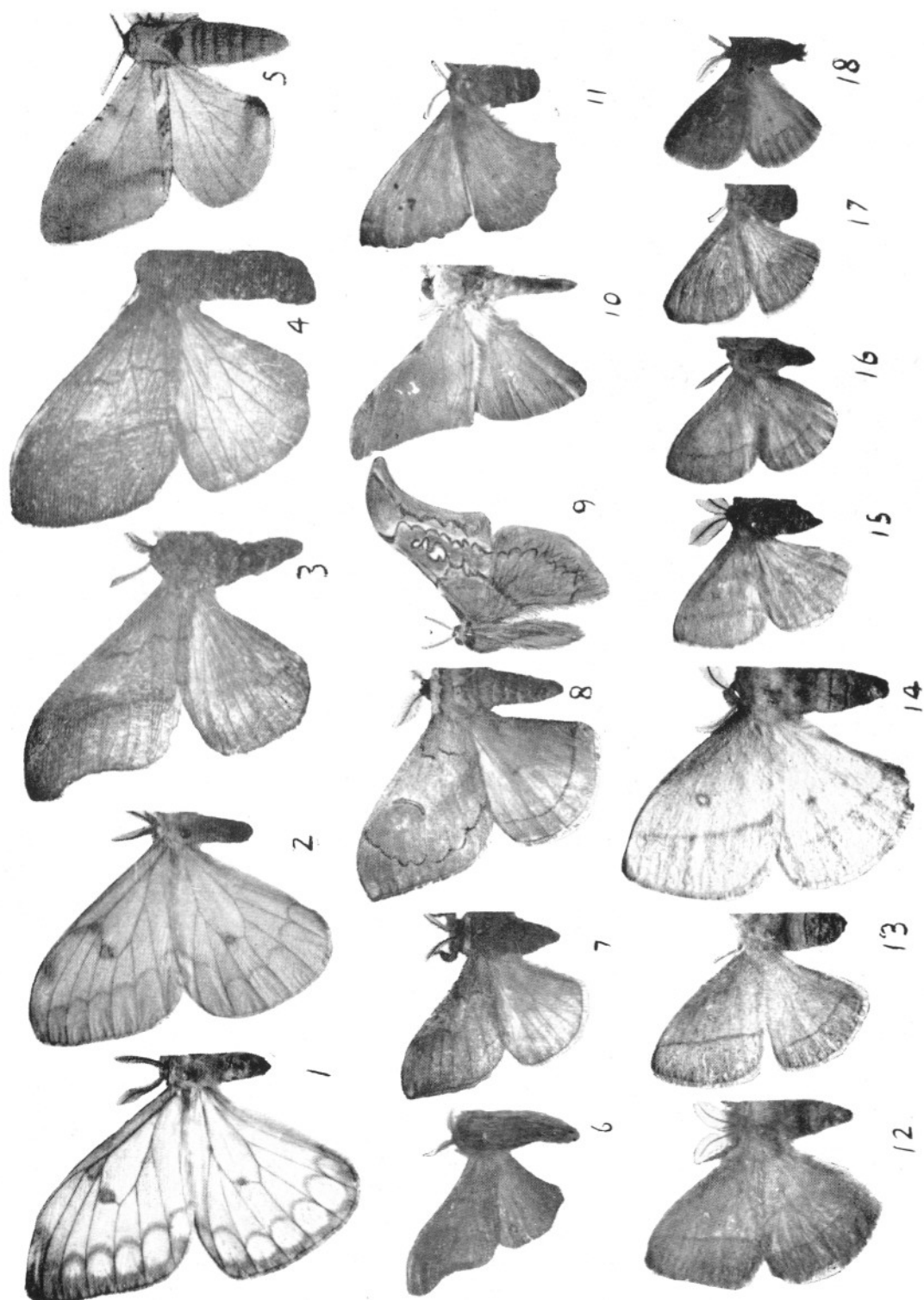
Pl. 17. 1. *Gynanisa maia* (male) 2,3. (females)
4. *Urota sinope* (male) 5. (female)



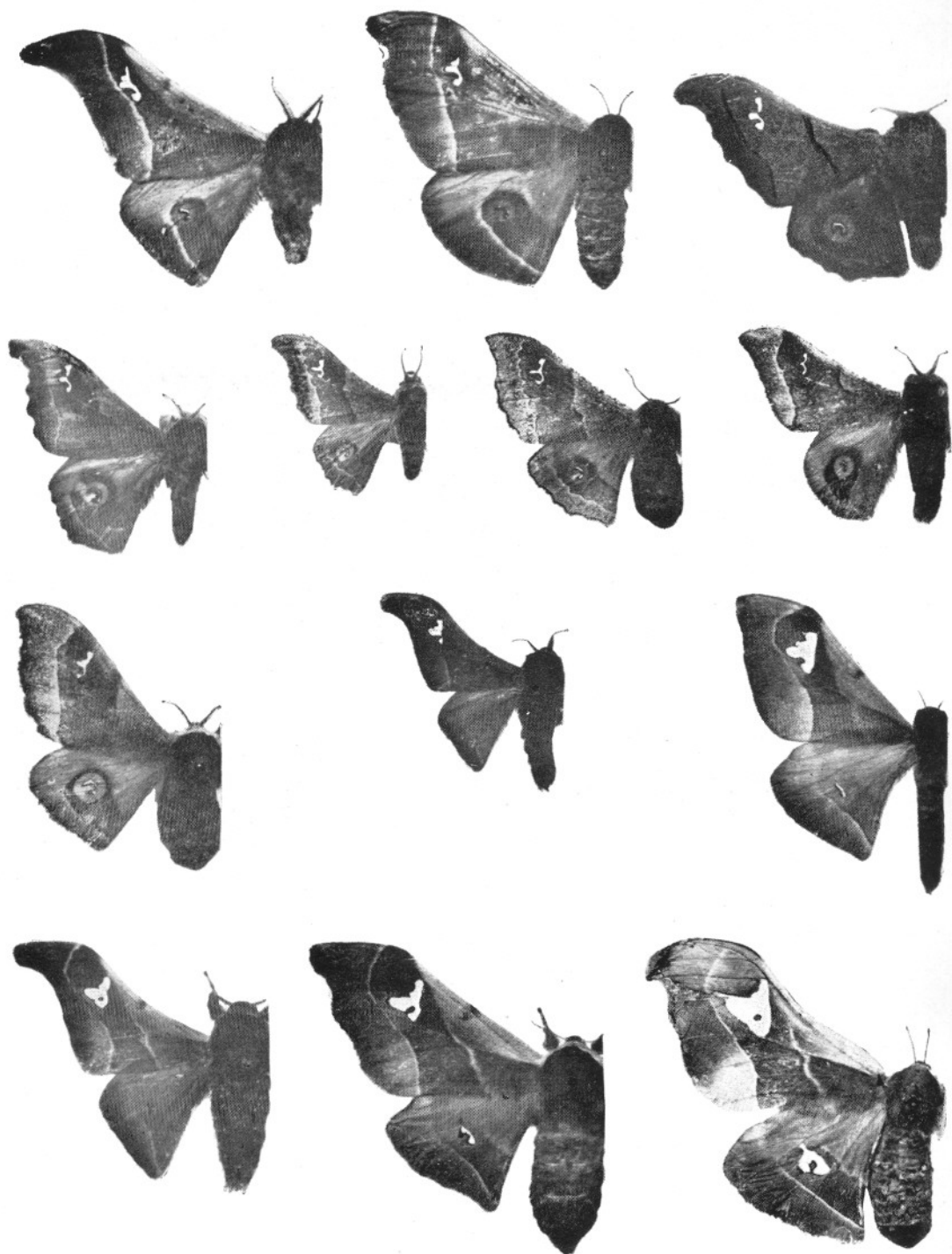
Pl. 18. 1. *Pseudanthaea arnobia* (male) 2. *Athletes ethra* (male) [after Seitz' xiv. Pl. 56.]
3. *A. steindachneri* (male)



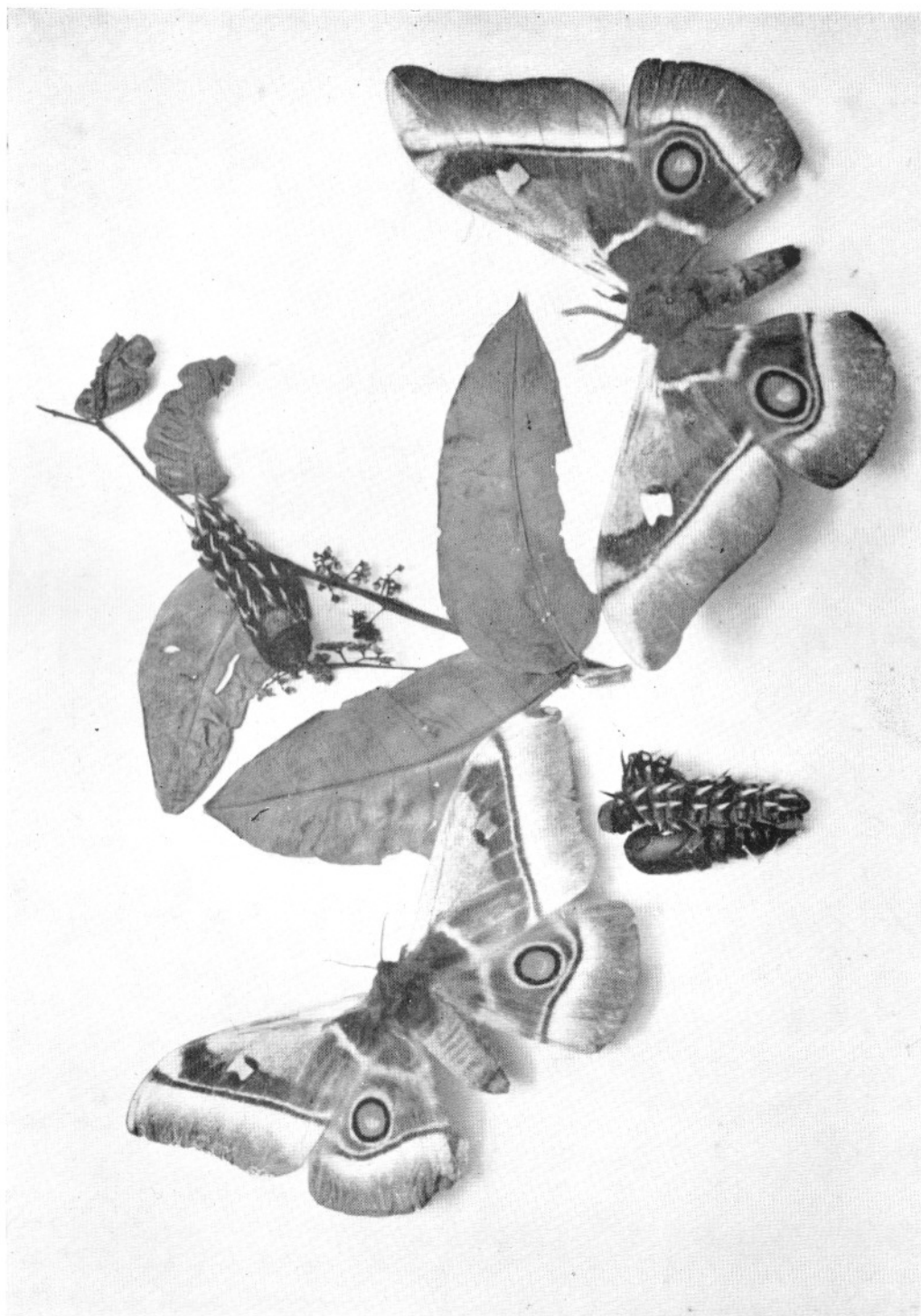
1. *Tagoropsis flavinata* (female) 2. *T. sabulosa* (female) 3. *T. songeana* (male) 4. *Pselaphelia flavivitta gemmifera* (female) 5. *Usta terpsichore* (female) 6. *U. terpsichore* (male) 7. *Parusta thelxinoe* (male) 8. *Heniocha marnois* (male) 9. *Usta wallengreni* (male) 10. *Usta angulata* (female) 11. *Leucopteryx ansorgei* (male) 12. *Heniocha apollonia* (female) 13. *Leucopteryx mollis* (female).



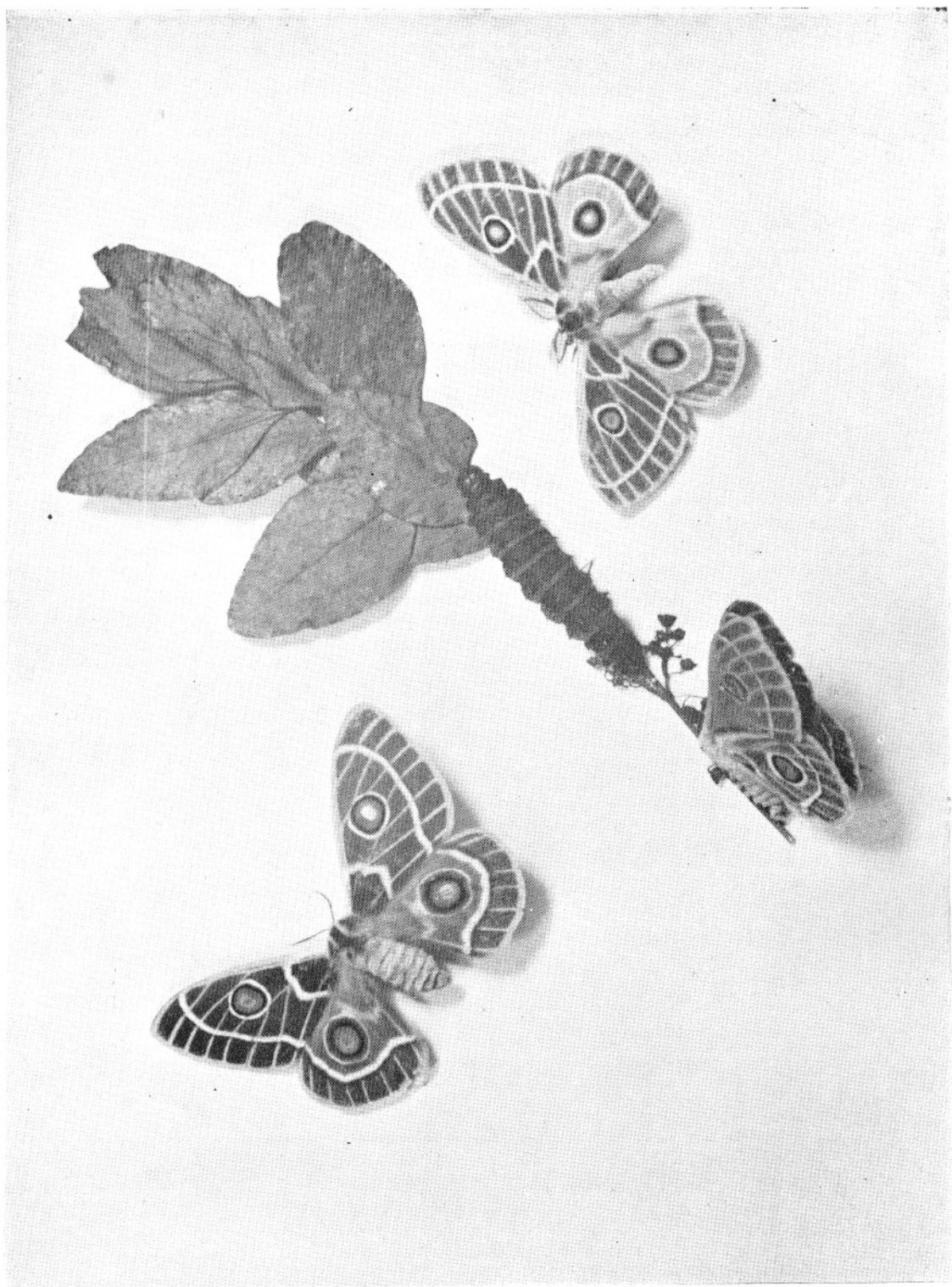
Pl. 20. 1/2. *Pseudaphelia apollinaris* (females) 3/4. *Micracogone ansorgei* (male, female) 5/6. *Micragone cana* (female, male) 7. *Goodia smithi* (male) 8. *Goodia kuntzei* (male) 9. *Orthogonioptilum adiegatum* (male) 10. *Orth. incana* (male) 11. *Eosia insignis* (female) 12/13. *Decachorda aspersa* (male, female) 14. *Decachorda fulvia* male, but too large by $\frac{1}{3}$. 15/17. *D. rosea* (male, female) 18. *D. bouvieri kitalina* (male).



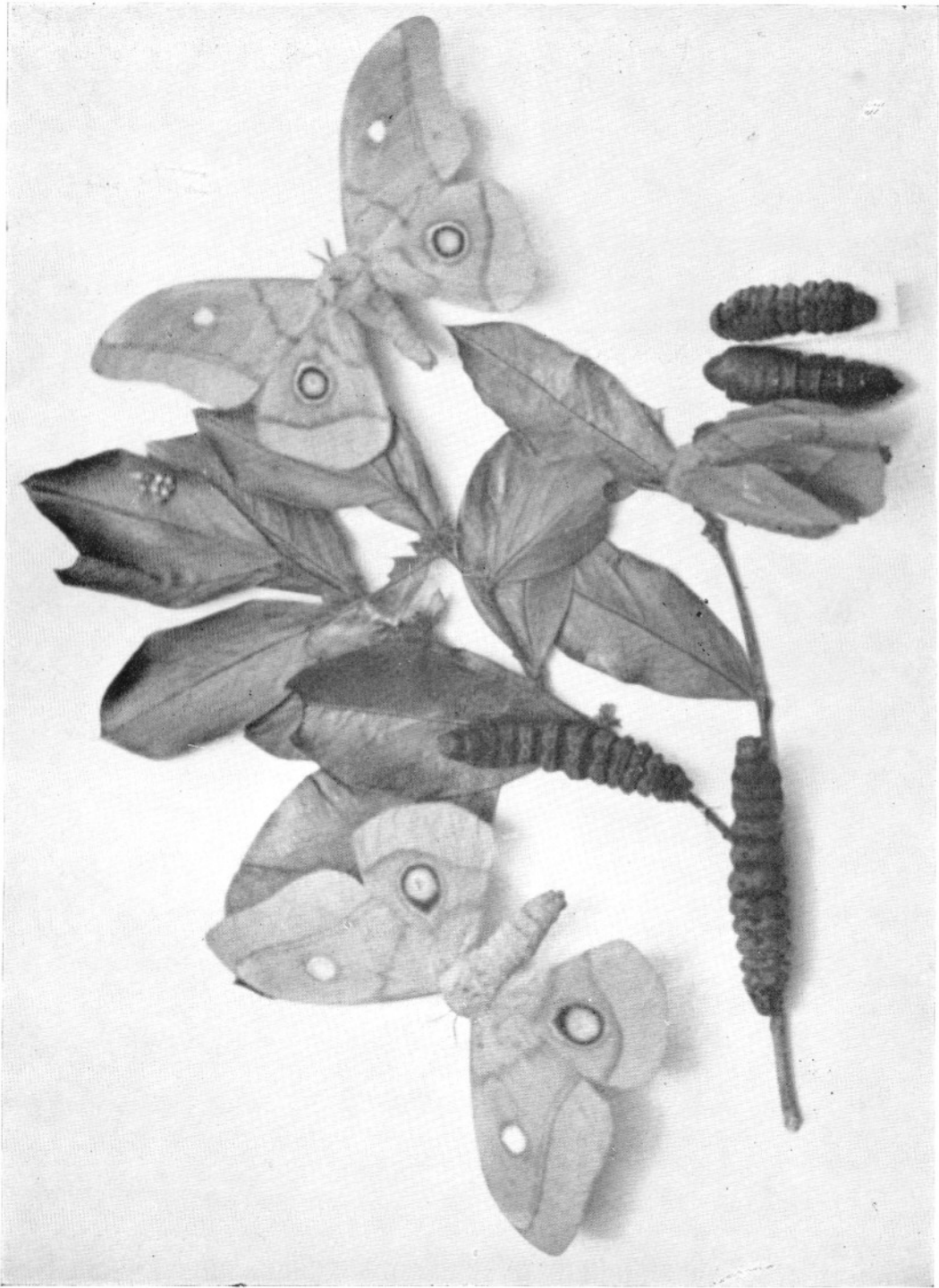
Pl. 21. 1,2. *Pseudoludia suavis* (male, female) 3. *Ludia orinoptena* (male) 4. *Ludia goniata* (male)
 5,6. *L. arguta* (male, female) 7. *L. hansali* (male) 8. *L. delegorguei* (female)
 9,10. *Holocera angulata* (male, female) 11,12. *Holocera smilax* (male, female) 13. *H. smilax* (large female)



Pl. 22. *Bunaea alcinoe*
Caterpillar, chrysalis, adults.
(about half natural size).

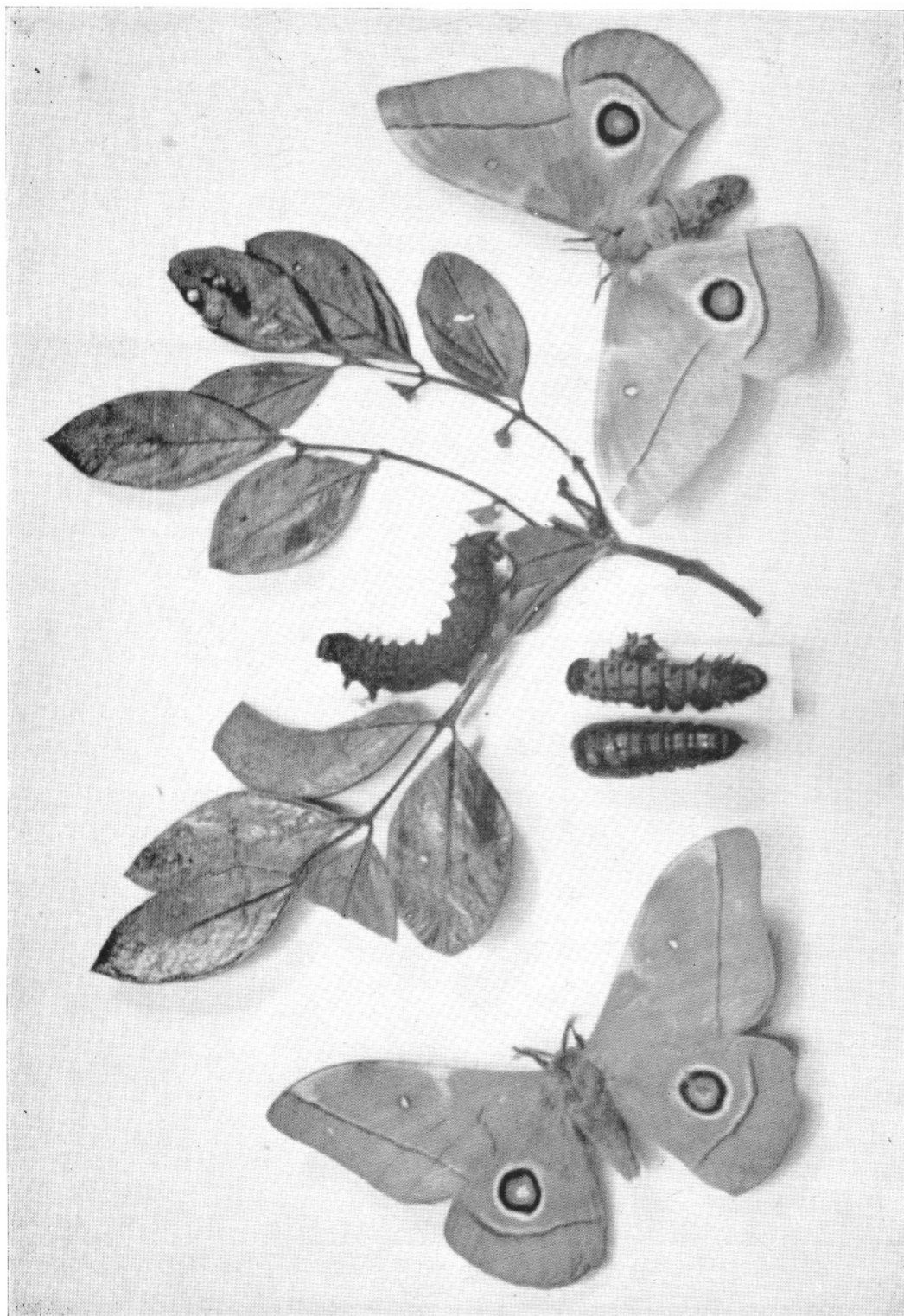


Pl. 23. *Nudaurelia oubië rothschildi* Caterpillar and adults. (about half natural size).

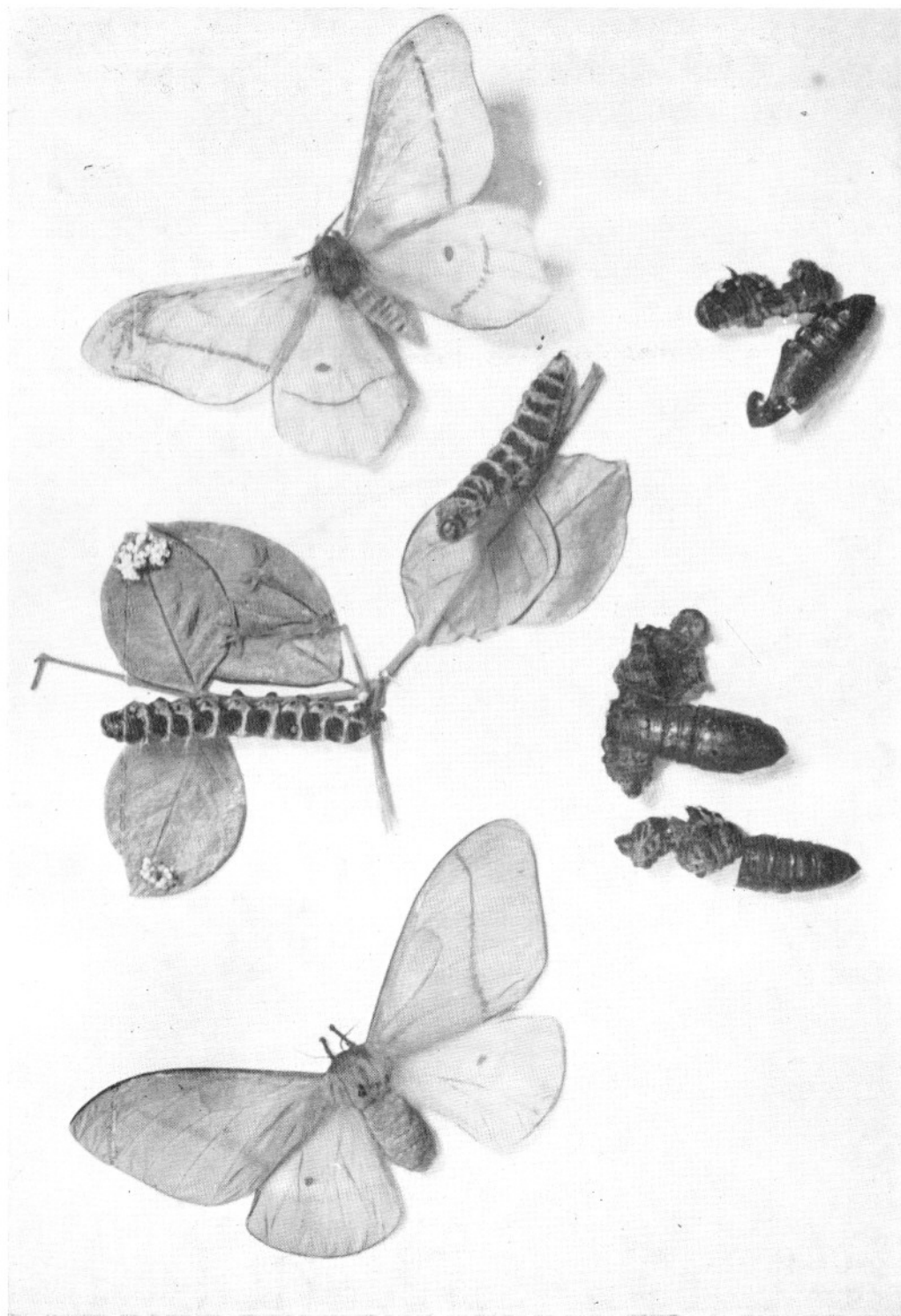


Pl. 24. *Nudaurelia krucki*

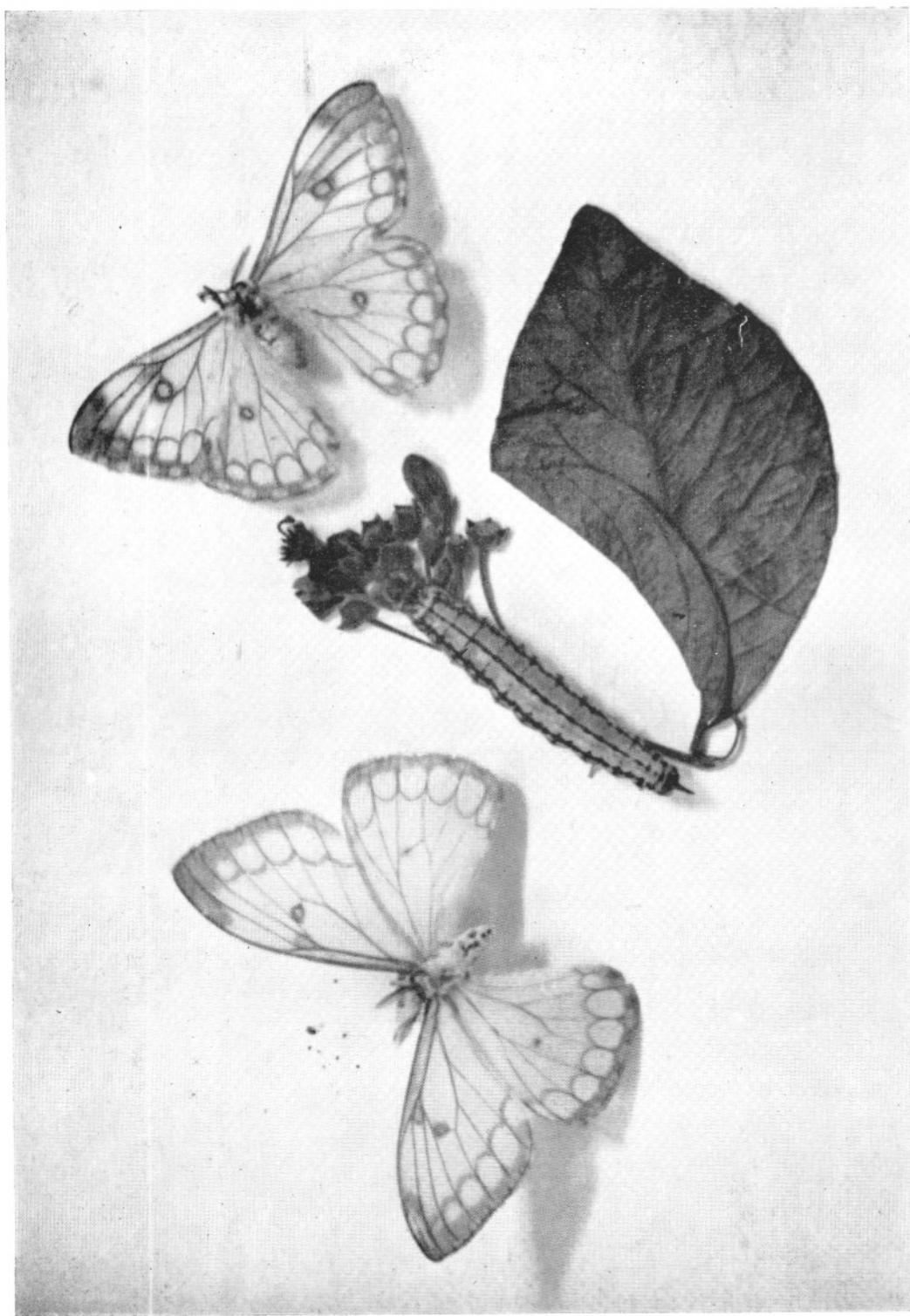
Eggs, Caterpillars, chrysalis, adults.
(about half natural size).



Pl. 25. *Nudaurelia gueinzii*
Eggs, caterpillars, chrysalis, adults. (about two-thirds natural size).



Pl. 26. *Cirina forda*
Eggs, Caterpillars, chrysalis, adults.
(about two-thirds natural size).



Pl. 27. *Pseudaphelia apollinaris* Caterpillar and adults, (Natural size).